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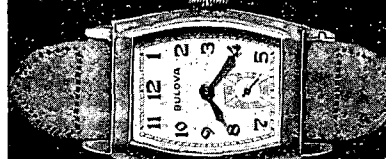
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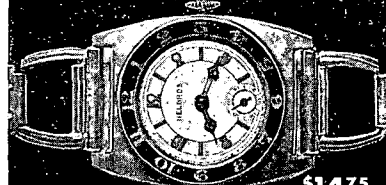
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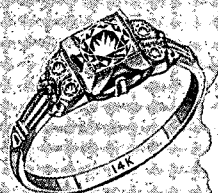
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VOLUME XVII
Number 5

ASTOUNDING STORIES

JULY
1936

A STREET & SMITH PUBLICATION

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Continuing the epic sequel to the "Legion of Space."

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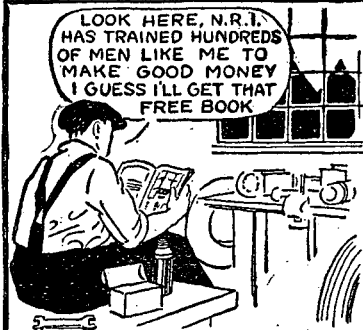
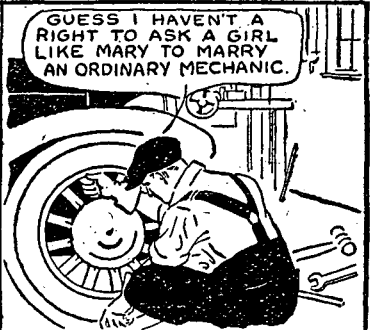
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28x4-75-20	2.50 .95
28x5-00-20	2.85 1.05
30x5-00-20	2.85 1.05
32x5-17	2.90 1.10
28x5-25-18	2.90 1.10
29x5-25-19	3.15 1.15
30x5-25-20	3.25 1.15
31x5-25-21	3.25 1.15
32x5-17	3.50 1.15
28x5-50-18	3.35 1.15
28x5-50-19	3.35 1.15
30x5-17	3.40 1.15
30x5-00-18	3.40 1.15
31x5-00-19	3.40 1.15
32x5-00-20	3.45 1.20
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33x4	2.95 .85
35x4	2.95 .85
37x4	3.25 1.05
39x4	3.25 1.05
41x4	3.55 1.15
43x4	3.55 1.15
45x4	3.85 1.25
47x4	3.85 1.25
49x4	4.15 1.35
51x4	4.15 1.35
53x4	4.45 1.45
55x4	4.45 1.45
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59x4	4.75 1.55
61x4	5.05 1.65
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65x4	5.35 1.75
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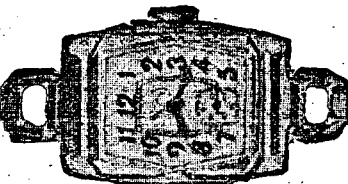
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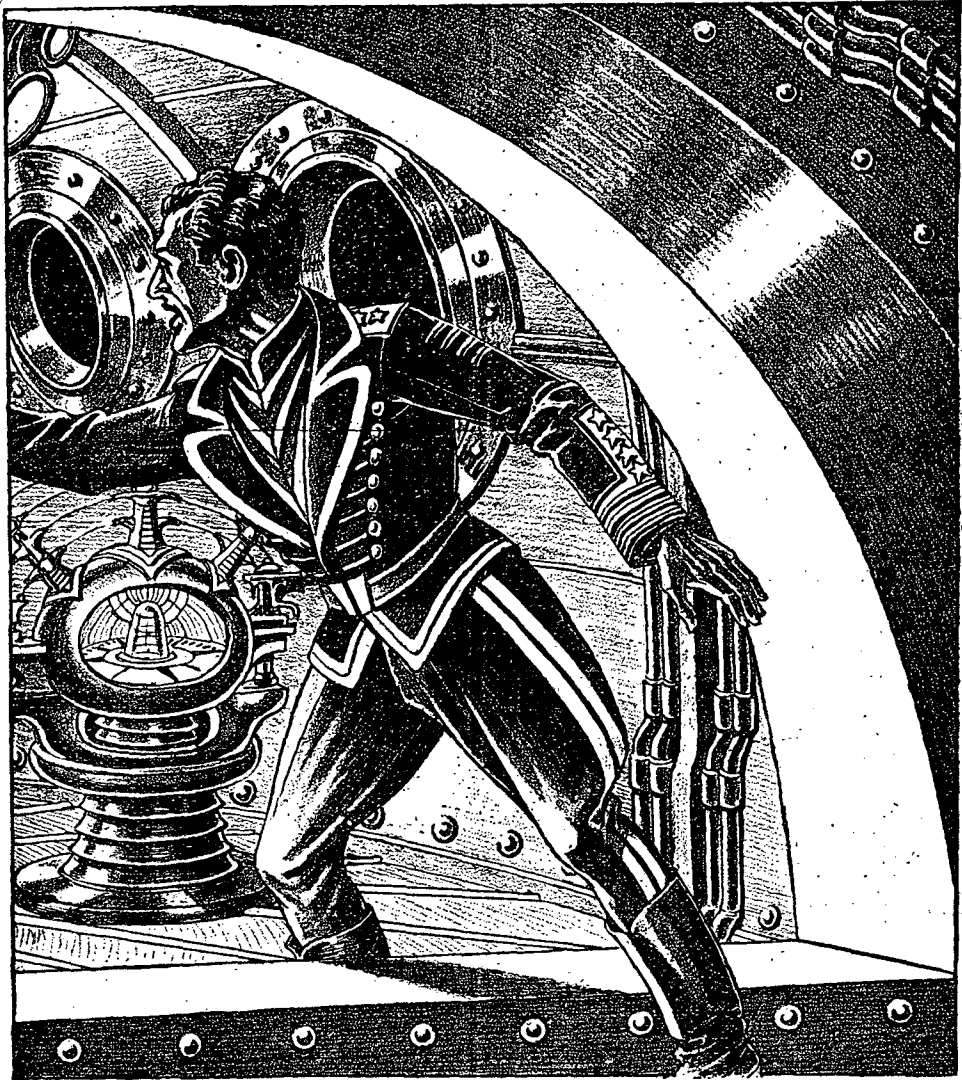


Being a partial biographical account of events which concerned one Randall Borden, one time captain of the space liner "Oakkit" in the years of the 29th century, A. D.

CAPTAIN RANDALL BORDEN was happy. His first major voyage was a success. Just one thing bothered him. The prison ship, heading out into space, which they had passed two days before, was graven in his memory. The lights of lost hope, heading out to the place from which there was no returning,

An intimate story of the 29th Century

by **WARNER VAN LORNE**



seemed lighted in his mind. Who were the men on board? Did they leave families behind? What was the crime for which they were sentenced to the planet of living death?

Randall had forgotten there was a ball in progress aboard, which required his attendance. His mind dwelt with those men, a million miles away by this

*What he saw didn't create fear,
but he was struck dumb!*

time. When he had announced they would pass fairly close, the passengers rushed to ports to view the sight. But their reaction sickened him.

Instead of pity for the unfortunate humans, they laughed and made fun.

A knock brought him back to realization of the duty to be performed. The second officer stood in the doorway.

"I'm sorry, captain, but the passengers are standing around like sticks, waiting for you to join them. There is even a hint that something is wrong because you've waited so long before making an appearance. May I announce that you'll be out immediately?"

"I know, Jack," Randall replied. "I'll try to be civil. I know you feel the same way I do—and all the rest of the officers. I shouldn't hold it against those poor fools in the cabin. They've been taught not to think for so long they can't have an idea of their own. I'll be right out—and dance with all the pretty girls. They certainly go for brass buttons in a big way. But I'll bet there's not one in the crowd who can tell what they stand for."

THE MUSIC stopped as the captain walked along the passage. The ballroom was crowded with couples, dressed for the greatest affair some had ever attended.

The vaulted metal ceiling tinted with gilt, and the changing colored lights, of the 29th century space liner's cabin, made it an entrancing scene. At the door, Randall hesitated, then, with a twinkle in his eyes, headed for the wife of the Martian commander. She'd been the bugaboo of all the men, from the time she came on board, and many of them nursed sore feet after a short dance.

But after one dance he changed partners. It was more than he could stand, just to show his dislike for the others. His feet ached from being tramped on so often; and he was hoping for relief long before the music changed.

Suddenly the musicians hesitated in the middle of a piece; space warnings were ringing. Every dancer stopped, fear in many faces. It could mean only one thing: there was some object ap-

proaching—possibly a meteor, but more likely another ship. But what could it be doing close enough to cause a warning?

When Randall burst into the control cabin the pilot was gazing through the forward plate, spellbound. A few hundred feet away another ship traveled along with them, so evenly both seemed to stand still.

Randall was mad. It was high offense to bring any minor ship close to a space liner, and this one was very small. Then fear in the face of the pilot made him look closer. What he saw didn't create fear, but he was struck dumb. *The ship was not from the Combine!* It was the personal ship of Prince Hamin, enemy of the Combine for many years, and a man they had been taught to fear from early childhood!

Randall pressed closer to the window—interested and mildly disturbed. There was no record of the ships of the two nations coming as close for nearly fifty years. What was the reason? Were they planning to attack?

Randall turned to shut off the alarm. There was no need of frightening the passengers. The other officers stood behind him, with the same look of consternation; so he issued an order instead of moving. But he left the plates closed over every port in the passenger section.

The other ship seemed to ride outer space without effort. It would have been impossible to handle the speed of the liner to ride with another ship that way. It never entered Randall's head to get in touch with them by radio; it was too well drilled into him to leave anything and everything belonging to the prince alone.

Suddenly the other ship started forging ahead. The speed increased to the point of almost blurring the form of the hull. The jaws of every officer in the cabin dropped open. They were dum-

founded. "It didn't seem reasonable—yet the action of the other ship so overshadowed their own as to make them feel foolish. The prince wanted to look them over, and when he was satisfied, just streaked off into space, leaving them to wonder.

When they recovered from the shock, Randall sent the men back to the ballroom. The passengers were notified it was a false alarm, but continued to talk in whispers among themselves. The officers tried to liven things up, but the party was a hopeless failure from then on.

When things quieted down and he could go to his cabin, Randall's mind was in a turmoil. What could it mean? Was the prince going to attack the Combine? It didn't seem likely, as he'd never bothered them after defeating their navy so disastrously nearly fifty years before.

Hour after hour his mind searched for a reason for the strange visit, but found no answer. He went back over the history of the two countries. It might lead to some solution.

II.

SPACE TRAVEL had led the world into trouble hand over fist. From the year 2310, when the first ship reached the Moon, things kept getting worse. They developed travel by leaps and bounds, with every nation wanting planets with their valuable metals and minerals, as well as peculiar forms of life. This soon led to open hostilities, with each nation seeking supremacy in space.

The first outbreak of trouble, between two small nations, set off the explosive, and soon every country on Earth was lined up with one or the other.

They used terrible war machines, wiping out big cities in a few minutes. Soon the world was a desolate ruin.

Nine months from the time of the first shot, the nations stopped for lack of anything further to destroy. The people were starving, and very little water was fit to drink.

As if with one accord they recognized defeat—not for one country, but for every combatant. Governments toppled and pillage became the main occupation of thousands. The few respected citizens were desperate. Civilization was at the breaking point. They formed small groups of vigilantes, and kept people under control by fear of force.

The year 2400 found the nations slowly heading back toward a semblance of former times, but space travel had been abandoned. There were less than a hundred million people alive after the war, to try and whip civilization back into shape. Small groups in different parts of the world were suspicious of each other. There was practically no commerce.

Wealth had been wiped out. There was more land than could be used for generations, and very little machinery to work with. It was a struggle to survive at all. The great war had set back Earth's civilization at least two centuries.

One progressive leader, Brant Ryan, decided it was time to straighten things out. There wasn't the slightest question that he was far ahead of any other leader in the world. He wielded the first international influence felt since the war. Commerce sprang up between countries that had been suspicious for years.

When he was able to swing the opinion of the population, he started a movement toward centralization of the millions. Europe was a vast graveyard of former high civilizations. It had been impossible to do away with the great havoc wrought by tremendous explosives used in the great conflict.

People lived from hand to mouth,

trying after nearly a century to restore their countries, yet it seemed a hopeless task for centuries to come. North America was damaged less than other continents and the people were far ahead of the others in comforts and culture. They had been able to salvage some of the great power plants to supply the remaining nine million people.

When a league was formed of the various small countries, Brant Ryan laid down his plan. It was well worked out, and there was little fault to be found with it. The people were desperate enough to try *anything* to get back a semblance of the former comforts of life. The crumbled civilization left by their forefathers was a silent mockery to their efforts.

They were to concentrate all the population of the world on the North American continent. They could push their civilization back toward the peak with greater momentum, with a government formed of all the leaders. They would rule for a term of twenty years, at which time a new government could be elected. This would give the new nation, embracing all the population of the world, a chance to adjust itself to new conditions.

Population had diminished since the war instead of increasing. Less than sixty million people remained, in less than a century. Race suicide stared every country in the face, and some solution must be found to turn the tide.

When the men finally turned toward their countries, it was to prepare for the great movement.

A year saw the accomplishment of the dream. Practically every one had been moved to the new home. Brant Ryan's people had worked night and day to carry on the work, and now they were ready for their own migration.

Then trouble started. The leaders of the various groups brought together

in the new country decided to install their own types of government.

Brant Ryan was eliminated from any authority, leaving his own people stranded from the movement he organized. They were disheartened for a moment when they realized they could only join the Combine on harsh terms. They grew bitter, and terrible hatred sprang up in six million souls, for the big population which had taken advantage of their leader's plan.

Instead of joining, they turned their back. They formed their own country in Australia, under Brant Ryan's leadership—with the determination to outdistance their hated big neighbor in every phase of civilized culture.

III.

RANDALL'S MIND jerked back to the present. He had been going over past history for an hour. Glancing at the small plate on the wall, the Earth had enlarged to show a distinct difference in coloring. It would be foolhardy to retire now. He might as well stay up to take the ship in.

He settled down again. It would be an hour before there was need for him in the pilot room. The speed of the ship had already been lessened, almost cut in half, while he dreamed. His men were on the job. He hadn't felt the vibration when they had started the forward jets. He couldn't have handled them better himself.

Slowly, his mind returned to the strange ship. There *must* be a solution! Perhaps it meant war. There was no way to tell until he stepped out at the port. From the time they hit atmosphere he would be too busy to get in touch by radio. They had never carried equipment to the point where they could cover any great distance. Radio was useless in space.

Thought of the last contact of the

two nations gave him a chill of misgiving.

For several centuries they had kept apart. Both had space ships, and each held planets by right of discovery. There were still too few people in the world to make enmity about possession. But the Combine had decided it was time to free the poor, misled souls, ruled by descendants of Prince Ryan, who had been made hereditary rulers. The Combine had advanced greatly since that far day, and should embrace all people on Earth with its enlightened civilization.

One of the Combine space ships landed in the country of the prince, out of control, in 2847. He repaired it, returning it to the nearest Combine port under command of its own officers.

The crew had deserted. The officers bore out this statement, but the public was skeptical. At first they doubted—then stories grew to enormous proportions about what happened.

"The men had been tortured and killed! The prince didn't *dare* touch the officers for fear of the Combine. But thought he could do away with the crew without any fuss!" Public opinion and the stories grew to fever heat.

PUBLIC FEELING finally reached the point where something had to be done. It was three years since the ship landed and the crew disappeared. The government decided to take a bold step. The fact that there were several million people not under their control was a sore spot that had to be erased.

Papers carried news of the great plan. The navy of the great Combine would sail down there and take over the government. It would be useless for the prince to resist; they had ten ships to his one—with many times the population, and every kind of device which could be used for warfare.

On July 20, 2850, the fleet soared aloft. They hadn't considered it

necessary to warn the prince of their plans. It might create resistance to overcome. Many thousand soldiers were carried for occupational purposes. They were going to teach the people in the alien country the advantages of civilization.

Quite possibly there were pretty girls there whom it would be a pleasure to teach. They left with a great fanfare of bands and waving hands. It wasn't considered war, but a trip of mercy, to free the downtrodden populace of a strange land.

They traveled slowly—taking three days to cover the space they could have covered in a few hours.

It was a grand lark until they approached the borders of the country, then a fleet of small ships appeared on the horizon. How the prince knew of their approach was unknown, but he certainly expected them. When his ship was within a few miles of their giant flagship, he called by radio. The answer from the commander of the huge Combine fleet was short and to the point.

"Prince Hamin, of Australano! By order of the great Combine, you are to surrender all authority to me. It will save life if you don't resist. We have come to take over your government and free your people from tyranny. There is no room for discussion; my orders and commands are plain. If there is resistance, I shall have to take you by force, and I have plenty of power to do it. We carry terrible weapons, which were unknown when the two countries were friendly, many centuries ago.

"I have spoken! If you don't ground your ships immediately and turn over command I shall have to shoot you down. There is nothing more to be said. I am signing off!"

The men felt a great satisfaction. Their commander's words must have wrought terrible consternation in the

small ships of the other fleet. If they resisted the invasion, they were surely inviting death.

IV.

SUDDENLY the ships of the prince came to life. They darted toward the huge ships of the Combine with incredible speed. Before the men were aware of the change, they were amongst them.

The two thousand big ships were in close formation and didn't dare use weapons, for fear of destroying their own ships. It took minutes to scatter enough to open fire. The two hundred small ships had done a lot of damage before the Combine prepared for the unexpected attack.

When they finally drew apart and opened fire—the small ships didn't fall! The huge ships had been equipped with disintegrators, but these seemed harmless.

The little ships darted back and forth like bees, with a deadly sting. The big navy was helpless.

Slowly the realization they stood at the mercy of the prince seeped into the thousands of doomed men. They had come to conquer a weak navy, and were literally being cut to ribbons. From a pleasure trip it had turned to massacre! The prince used weapons they had never heard of, and had some power which offset their own disintegrators. Instead of *his* suicide, it was *their own*!

The battle was short. From the time the small ships first came amongst them until the giant flagship dropped, was not over ten minutes. The falling flagship signaled complete rout of the great navy. They turned with one accord to escape annihilation; it was death to remain.

The small ships didn't follow, but stood in the air as if suspended, while their own ships needed momentum to stay aloft. When it became clear they weren't pursued, they stopped the mad

flight and picked up a broadcast by the prince.

"Fleet of the Combine! You came down to my country looking for trouble. I was sorry to destroy so many of your ships—but you forced it upon me. For many generations we have lived apart, without communication. It will be well to continue so.

"I am withdrawing from the field of battle now. You are perfectly safe in returning to care for any survivors which may be alive in the fallen ships.

"Inform your government that it is not only my desire that they keep away from any of my possessions, but my command and warning. If there is any recurrence of this mistake, I will inflict such punishment as you deserve.

"Give my regards to your government, and tell them I regret that I had to destroy such cumbersome ships as they sent to greet me. Prince Hamin speaking."

Fully half the men in the fallen ships were alive, and were carried back to the Combine in the defeated fleet.

Laws were passed against approaching any possession of the prince. No Combine ship had given any reason for complaint on the part of the prince for the half century since. Their fear was complete.

V.

RANDALL'S MIND snapped back with a start. Perhaps after all this time the prince was planning revenge. The schoolbooks didn't depict the story exactly as he knew it—but his grandfather, an officer of the navy, told him all the facts. He'd never been able to feel the hatred and bitterness most of his friends felt toward the enemy nation. They had many things in their favor, and the attack was unprovoked.

The Earth had grown to enormous proportions in the visiplane now, and the captain slipped into his coat to go forward. Another hour would see the

end of the journey. There was no more time to ponder over the strange ship.

Just before they touched atmosphere, Randall took over control. It was ticklish to land an outer space ship. The three-mile groove had to be touched just right to bring the ship to a stop at the platform. Many times a ship either stopped short or passed beyond the point and had to be towed back. They were completely helpless to land anywhere except in the docks built for them. Friction was the only way to stop, and the long drag in the groove pulled the great ships to a stop.

It was economical to use ships built only for travel between two space ports. They required much less equipment, though any trouble was disastrous. A forced landing generally cost the life of every one on board, but the economy of construction was necessary.

Simplifying equipment had enabled them to travel to many distant planets and carry on trade. It would have been out of the question with ordinary ships. The Combine had grown more and more toward use of set course ships as time went on. From the inauguration of the first ship of the type, thirty years before, they had grown in favor until four out of every five ships were of the same construction.

The screaming of the metal runners on the composition groove was deafening even inside the hull of the giant ship, and it brought a frown to Randall's forehead. Why should the Combine have to use such equipment when they knew for a certainty the prince operated ships that were safe anywhere, as well as being several times as fast? Somehow it didn't seem right.

They drew to a perfect landing, the ports of the ship opening onto the platform without moving an inch from the first stop.

Randall stepped onto the platform

with a happy smile. It was nice to be back on the home planet. Other ports were nice, but there was nothing to compare with the good old Earth.

Several officials met him as he stepped out. None that he could place offhand, but three years make a lot of change anywhere. Although a space-port job was usually for life.

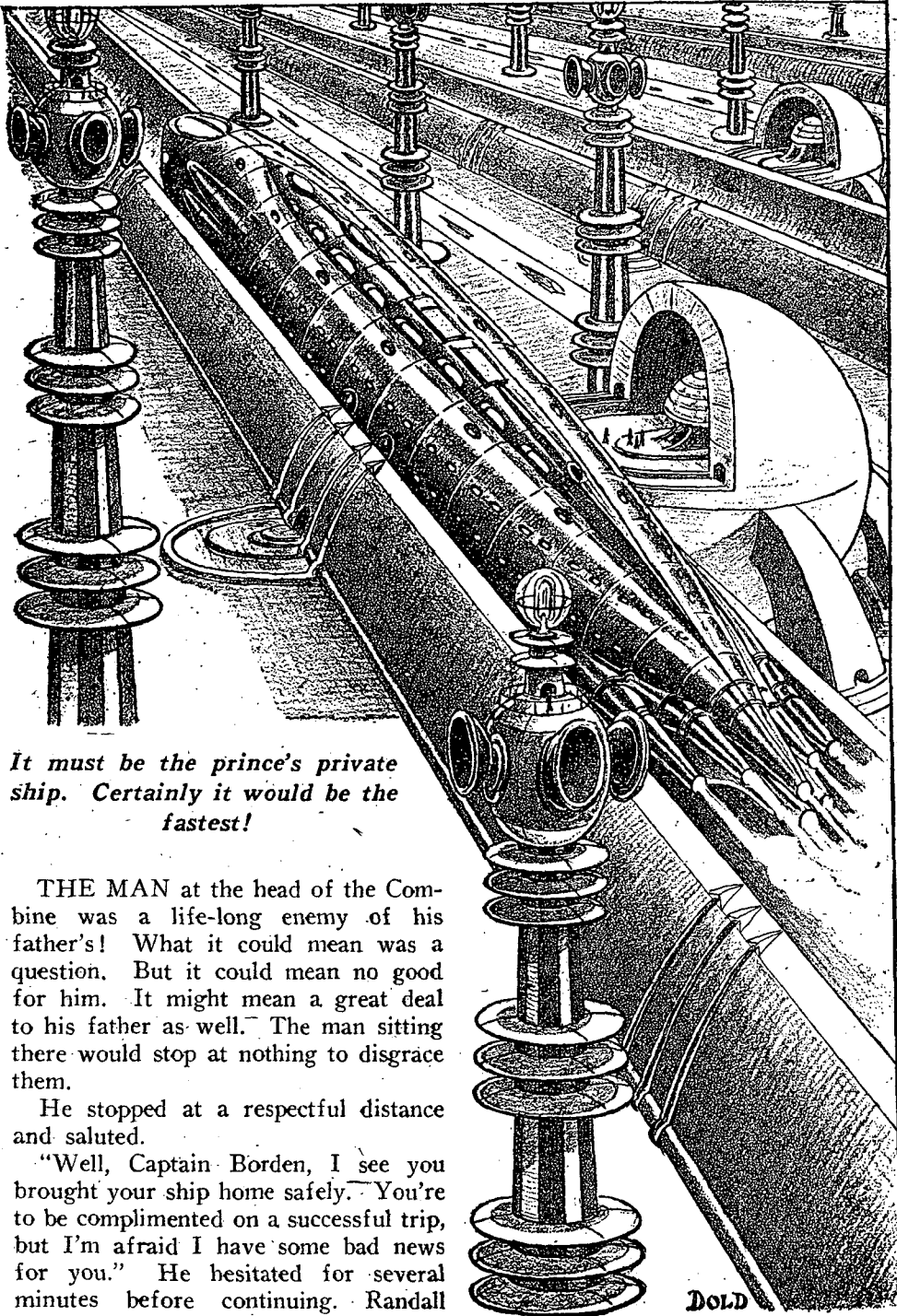
The chief officer came forward, "Commander Borden?" As Randall nodded in assent he continued. "I'm Squadman Hoff—here by order of the commandant, to conduct you to his offices."

It was strange to be met this way, but Randall shrugged his shoulders. There could be only one answer. He'd just finished a long trip successfully, with far less trouble than ordinarily experienced, and rated some commendation. Probably the commandant wanted to commend him personally.

Within a few minutes they stood outside the huge doors leading to the vast chambers. He'd been there once before, when he was awarded the commander's license. It was strange the men with him were all armed. The honor guard was generally unarmed. But perhaps the custom had changed while he was away.

As the doors opened he felt the first qualm of misgiving. A strange premonition seemed to drag his feet back, and the fact that his father was not the first man at the dock to greet him came back to his mind. Something was wrong, but he couldn't place it.

As they strode down the long aisle toward the raised seat at the far end, he *knew* something was wrong! The man who sat at the head of the room wasn't the one who was there three years before, yet there was something vaguely familiar about him. Then he drew close enough to recognize him, and felt a twist about his heart. *Everything* was wrong!



It must be the prince's private ship. Certainly it would be the fastest!

THE MAN at the head of the Combine was a life-long enemy of his father's! What it could mean was a question. But it could mean no good for him. It might mean a great deal to his father as well. The man sitting there would stop at nothing to disgrace them.

He stopped at a respectful distance and saluted.

"Well, Captain Borden, I see you brought your ship home safely. You're to be complimented on a successful trip, but I'm afraid I have some bad news for you." He hesitated for several minutes before continuing. Randall could feel the pleasure he took in the suspense.

DOLD

"Things have changed considerably while you were away. The former commandant died by accident—more is the pity. But we have to carry on to the best of our ability. I know it must make you very happy to see me in this position."

The sarcasm was almost more than Randall could stand. Makin was even sarcastic about the former commandant, who had been well liked. But he held his peace, waiting for the man to finish his speech. Somewhere his father fitted into the picture. This man wouldn't let him hold any position of importance if he could prevent it. His thoughts were interrupted as the man continued.

"I regret to say that my former very good friend, your father, got into slight difficulties with the authorities. It was a most *deplorable* affair!" He hesitated again, but when Randall kept a tight mouth, he went on.

"Soon after I came into office he brought before the governing board an instrument of great value to navigation. I had known for many years that he was working on it, but wasn't in a position to say whether it should be used or not. I'd almost forgotten the fact until he brought the instrument before us.

"He succeeded in developing a compass which could be set on any destination and would hold to that point, without variation. This will help greatly in our space travel, and enable a navigator to hold the most direct course. But there was one thing we could not overlook. He'd spent many hours working on it—when his time was *supposed* to be used for the manufacture of space ships.

"Until this we'd never noticed any let-down in his work, but he brought us proof of it. If he'd spent the same energy in building ships—we might have a far superior navy to the one we

have now. It was regrettable; but we have appointed inventors for that work. It was far afield from his duty.

"Naturally, this constituted a very grave offense, but we were lenient with him. Where it should have meant a death sentence—we sentenced him only to life imprisonment—on the prison planet!"

Randall's world crashed around his ears! *His father*—a prisoner on the dreaded prison planet! For a moment it held him speechless, then he found his tongue.

"Why, you dirty dog! *You*, the commandant! You're not fit to clean his boots, let alone sentence my father to prison! You contaminate the chair you sit in!"

Suddenly, Randall stepped forward, while a purple tint spread over Makin's face; but guards grabbed him, wrapping a cloth over his mouth to stop any more insults to their leader. He was dragged out, but he struggled so hard they hit him over the head.

Hours later, he awoke to find he was in prison. For a long time he sat with his head in his hands, a feeling of complete hopelessness overcoming him. But, slowly, he brought his troubled mind back to the present. He must do something! There must be *some* way to rescue his father, though such a thing had never been done.

The only prison ship was the one they passed a few days before—and his father had been on it! If he'd known it, the ship would never have passed. And the crowd of passengers had *laughed!* Bitterness crept into his mind. If he could get his hands on the man who sat in the high position for only a moment, it would be worth any torture!

He realized he was one in thousands. The general public would believe the sentence fair—that *he* was wrong. For the first time he questioned the fitness of their government. It was not the

individual, but the whole system which was to blame. The commandant had done no more than many others would in the same position.

THREE MONTHS LATER, Randall looked back at his carefully laid plans. He had been very well-behaved, and even begged the pardon of the commandant for his outburst. It was bitter to think what he had been through, but gradually things had worked out the way he wanted. He had finally been appointed teacher of the children of the officials, with freedom of the space port for his instruction. They were fools—to think he could eat dust at their feet.

His former officers had been so strong in standing up for him that they were put to work overhauling space ships as they lay in the dock. Their licenses had been revoked. It was very degrading for all of them and Randall felt a qualm of conscience over their position.

Commandant Makin's daughter, Gorna, was a very adept pupil, even if she was the daughter of his enemy. She learned faster than any of the others. She begged him to give her special instruction, and he finally agreed. She'd done her best to make things easy for him, and it was only fair to her.

One afternoon, Gorna stayed after the regular class had been dismissed, and he took her on board the ship turned over for teaching. Each ship was different only in minor details, and they decided it was foolhardy to keep a ship in port for instruction, when any that was lying over could be used.

This ship was familiar, and as they walked along the main hall he recognized it as his old liner. It brought pangs of loneliness that had not bothered him before. He seemed in a trance, Gorna's questions unheeded.

Suddenly he realized they weren't alone. His old officers were working

over the oxygen equipment. They drew together for a reunion, Gorna at the side unnoticed.

It wasn't long before Randall recalled his duty and left the men to go forward. From Gorna's expression, she understood the great friendship between the men.

When they entered the pilot cabin, Randall fondled the levers. It was mighty good to feel the old controls. He explained their operation, but his mind remained far away. Several times he glanced toward Gorna, but she was engrossed in her notebook.

Suddenly he squared his shoulders, facing the plate in the front of the hull. The long groove was clear, and he slowly touched the port controls. The glow died in the buttons which remained red as long as the ports were open. When they were shut in, a small lever moved slowly back under his guidance. The ship quivered, then seemed to come to life as the whine of the friction runners grew to a scream. Gorna was forgotten; the other men were forgotten—he was heading into space!

The ship left the groove far behind, mounting steadily toward the heavens. Randall only half realized what he was doing—but he was in space again, at full acceleration! The feeling was worth any consequence he might have to face later.

SUDDENLY Jack Morrow tapped him on the shoulder. "Randall, snap out of it! I don't know what you plan, but there's no reason to commit suicide! We haven't enough fuel to get back to port! This ship was drained for repairs! We'll follow you in anything you say—but we can't go far."

Randall was brought out of his dream with a jerk. He'd snatched these helpless people away from the Earth—in a ship with only drainings in the fuel

AST-1

tank! His brain raced! There *must* be some way to avoid a smash-up. He'd only a hazy idea of what he was going to do when they took off with the commandant's daughter. They wouldn't be attacked with her on board—but he hadn't thought much further. Now their lives were in his hands—and the jets were beginning to misfire!

Cold sweat stood in beads on his forehead. He wasn't afraid—but the people with him? He had six lives to think of beside his own. *All* snatched away from life through his foolishness.

He was trying to find some solution. Already the ship was started on a long curve, to take it back inside the atmosphere. He'd been using full acceleration, and they may have traveled a long way. It was impossible to tell how fast they'd been going with an empty ship.

They'd land far from the Combine; that was certain. But what part of the world was a question? He'd been heading south to avoid pursuit.

By traveling at high speed they could cover a big distance before he'd have to set it down. If they could locate a treeless plain and use it as a skid to make a landing—but suddenly the ground grew darker. They were beyond the rays of the Sun! What little hope there had been of a landing was gone now.

He watched the altimeter like a hawk. If only they didn't come down amongst hills, there was a chance. It crept slowly back toward zero as they burned through the air at terrific speed. 5,000 then 4,000 then 3,000—it was close to the point where he would have to try the one chance.

Suddenly the nose of the ship went up. A blast from the lower jets sent it reeling toward the heavens, throwing every one to their knees. The ship headed straight up for several hundred feet—then hesitated—and started falling by the tail!

It fell a thousand feet, and a blast from the jets sent it up slightly again—nearly jerking their arms out of the sockets with the force. Again it dropped and a short blast of the upper rockets kept it from turning over. This process seemed endless, but the altimeter registered less each time.

Slowly they were coming to Earth, and Randall's heart stood still for fear the jets would fail to react when they were needed. It passed beyond the stage of altitude, and turned to guesswork as to height.

Just as the jets were started again they felt a jar through the ship—they'd touched! He opened the lower jets to their utmost. It threw the hull down hard, and as it started to level off he opened all the jets—then jerked them shut again. He was going to lose consciousness!

The forward push cushioned the worst of the smash, and Randall opened his eyes to look around. He had been thrown across the cabin but didn't seem to have any broken bones.

The first person he saw was Gorna, her eyes bright as stars. He started to look for the others, when she spoke. "That was swell, Mr. Borden! I never thought I'd live to see a tail landing—but I have! I wouldn't have missed it for worlds!"

When Randall could recover from the surprise, he saw startled looks on the other faces. Then one of them laughed. It broke the tension, and Randall realized one of the control levers was clutched in his hand, broken off by the weight of his body.

Slowly the little party got to its feet. Jack Morrow had a beautiful black eye. Tony Jones looked as if he'd met something solid with his nose. Boris Jackson was unhurt. Truine Dean had a barked shin, which he was nursing. Tom Harris was the only one really hurt, and he had only a sprained ankle.

AST-2

They considered themselves very lucky. It was seldom a tail landing was made without costing the lives of most of the crew; yet they were hardly hurt. Gorna Makin, daughter of the commandant, was a great wonder to them. She'd thoroughly enjoyed flirting with death. They felt dislike for any member of the commandant's family; but she earned respect.

VI.

THE SHIP was a complete wreck; it could never fly again. Some of the batteries were intact, and a little work on the lines sent energy to the equipment for cooking.

The lights didn't fare so well, but new bulbs from the storeroom lighted things up again. The emergency lights put too great a drain on the batteries and they replaced them as soon as possible with the standard circuit.

It was impossible to tell how long they would have to stay there. They couldn't leave until Tom Harris could walk on the injured ankle.

The emergency rations were intact, and there was ample food for months if necessary. They had landed in heavy timber, which had crushed like match sticks. It saved them from worse damage, acting as a cushion to the terrific weight of the space ship.

When they returned from the tour, Gorna had set a table and was putting hot dishes on. Instead of being an outsider, she was one of the party, and kept them lively.

The radio was hopelessly beyond repair. They were completely out of touch with the Combine.

Randall took their position from the stars, but the instruments were smashed and he'd never been trained to any extent without them. The report he gave to the others wasn't very heartening.

"I'm sorry, fellows, for the spot I've

got you in, and especially sorry I brought Gorna into the mess. There's not one chance in a thousand we can repair the radio and call the Combine, and it may be months before they look this far south for the ship. They'll keep searching because the commandant's daughter is with us, but I'll bet they'd give a lot for my neck right now.

"If you wait here, they'll locate you sooner or later, and you can return to the Combine, but there's no returning for me. With Gorna to tell them the facts there's no danger of you being blamed for stealing the ship. It was done before you could raise a hand to stop me.

"We're only two hundred miles from the nearest outpost of Prince Hamin, if my calculations are right, and I intend to head for his country. This ship is wrecked and worthless to me now. My sole reason for stealing it was to rescue my father. Now I intend to try and steal a ship from the prince. It's the only possible way for me to free my father from the prison planet, which has been my sole aim since I learned of his sentence.

"I hope to leave here within a few days. The land thrown up by the great earth tremors of 2430 left a strip that must reach to the beginning of their agricultural country. I'm going to wait a few days, and then leave you. It can do no good for me to stay, as it's possible the searchers may locate the ship before long and I want to be away before they do. If I succeed in stealing a ship, I can notify the Combine of your location, and they can send for you. There's ample food to last for months, with no possibility of your facing hardship.

"I have the highest admiration for Gorna, and can't understand how she can be the daughter of the man who sentenced my father.

"If you will excuse me I'll turn in. It'll seem good to get into the bed I knew for so long."

THE rest of the party was silent for several minutes after he left the room. They were too busy with thoughts of their own. Finally, Gorna broke the silence, to inquire about Randall's father. She knew nothing of what took place, or why he was sentenced. When they explained carefully, and tried to keep their feelings from their tone, she fell silent again.

After a while she spoke, "I *can't* blame Randall for feeling as he does. Any one would feel the same way, and I know my father is unreasonable toward any one he dislikes. But tell me? Would you men wait and return to the Combine if I wasn't here? Or would you join him in the trip to the land of the tyrant?"

They had to admit they would follow. They were in disgrace in the Combine due to their standing up for Randall, and couldn't be in much worse circumstances in a strange land. When Gorna heard this, it only confirmed her suspicions.

"I think *I* might have *something* to say about what is done! You could have stopped him before we were far from the port, but I was helpless. I've enjoyed the trip so far, even if we did smash up, and don't look forward to returning to the Combine.

"If you'll let me, I'd like to join you in the trip. It'll be the greatest adventure any citizen has been through for generations. It'll be greater than a trip to a new planet—we know less about the country. They can return me to the Combine without much trouble. Won't you try and get Randall to take us all along?"

This was a surprise to the men, but they admired the girl's spunk. She certainly was a good sport. It would

be a hard and dangerous trip, but they had no right to deny her going if she wanted to.

Persuading Randall was different. He almost abandoned his own trip before they persuaded him.

Only necessities could be taken along, as they had to carry everything. Gorna was fitted out with clothing that belonged to one of the former crew.

VII.

A BEDRAGGLED PARTY climbed the rise of ground beyond the last salt marsh. Weeks of hardship were behind, but they stood on the threshold of their aim. Dusk was falling before they could see the first cultivated land. Rambling buildings, a mile away, were a welcome sight. It meant human beings, and human conveniences.

Lights appeared in the windows before they reached the house. The outlines of the building resembled pictures of houses they'd seen in ancient history. It might have been cut from a page picturing conditions before the great movement.

They were accustomed to community dwellings, housing hundreds of families, with every need taken care of within the structure. The one before them represented a very backward form of civilization to them. For the first time Randall felt hesitant about going on. But they had passed days without adequate food, and needed help.

The others waited while he approached, wondering if he could make himself understood. What language did the inhabitants speak?

A woman came to the door, hesitating a moment before inviting him in; then she said in perfect English, "Come in! You look as if you had tried sleeping in every mud puddle you could find. Where on earth did you come from?"

For a moment, Randall was taken back by the friendly attitude, but soon found his tongue. "We were wrecked, with a space liner, about two hundred miles from here—across the salt marshes. We are from the Combine, but hope to be friendly toward you. I have six companions with me and we all need food very badly. I hope you can do something for us, as we want to try and see the prince before we are sent back." At the moment his words sounded foolish, but she seemed to think he told the truth. A man joined them a moment later and called the others in.

They sat down to a meal they did not dream existed. There were no rations—everything was served in quantity. They helped themselves! As they were sitting down Randall thought of something.

"I'm sorry, but I'd forgotten to tell you. We have no money. We're beggars for anything you give us."

The man stepped forward. "Say, young man! You certainly can be insulting! What do you think we are? We're not interested in your money. What kind of a country do you come from anyway? I've heard a lot about it, but you're the first people I've seen from there."

Randall did most of the talking—telling all he dared about their accident, and little things about their own land. No one could possibly serve a crowd at home without having to explain to the authorities. Everything was rationed out, and held to the minimum requirement of each person. It would have required real hardship to hand out the amount of food they were eating.

After dinner the man called some station by radio, and after a long conversation told them he had made arrangements for their transportation to the capitol. The prince was furnishing the transportation, and they were to start the first thing in the morning.

They were put to bed in separate rooms, and had their first good night's sleep in a month. But they enjoyed baths more than anything else. They were clean, after weeks of dirt.

They could not comprehend a form of government where each man was his own master; and marveled still more when the man brought out an automobile in the morning. They didn't know there had been one, for centuries, except in a museum. In the Combine all travel was in the air.

When they started, the seven passengers were scared half out of their senses. They'd always been accustomed to high speed, but far above the Earth. The ground rolling under them so fast was too much to stand. Their nerves were at the breaking point when they pulled into an airport, after an hour's ride.

When they said good-by to their friend of a day, it was with real regret. They could not possibly have been better entertained.

HOURS LATER the plane dropped toward a small flying field, within the walls of a huge building. It was government offices, with a landing field for their own use and official business.

Everything seemed perfectly planned.

They were expected and taken directly to rooms assigned to them. Fresh clothes were brought in after slight measurements. They seemed to be treated as honored guests, which was quite a surprise, and the men vowed that if they had an opportunity they would remain.

They were served another meal in a small sitting room, that opened off all their separate rooms. The meal was just as big as the ones with the farmer; and they wondered still more at the waste of food. These people didn't seem to ration anything.

They had to wait for morning be-

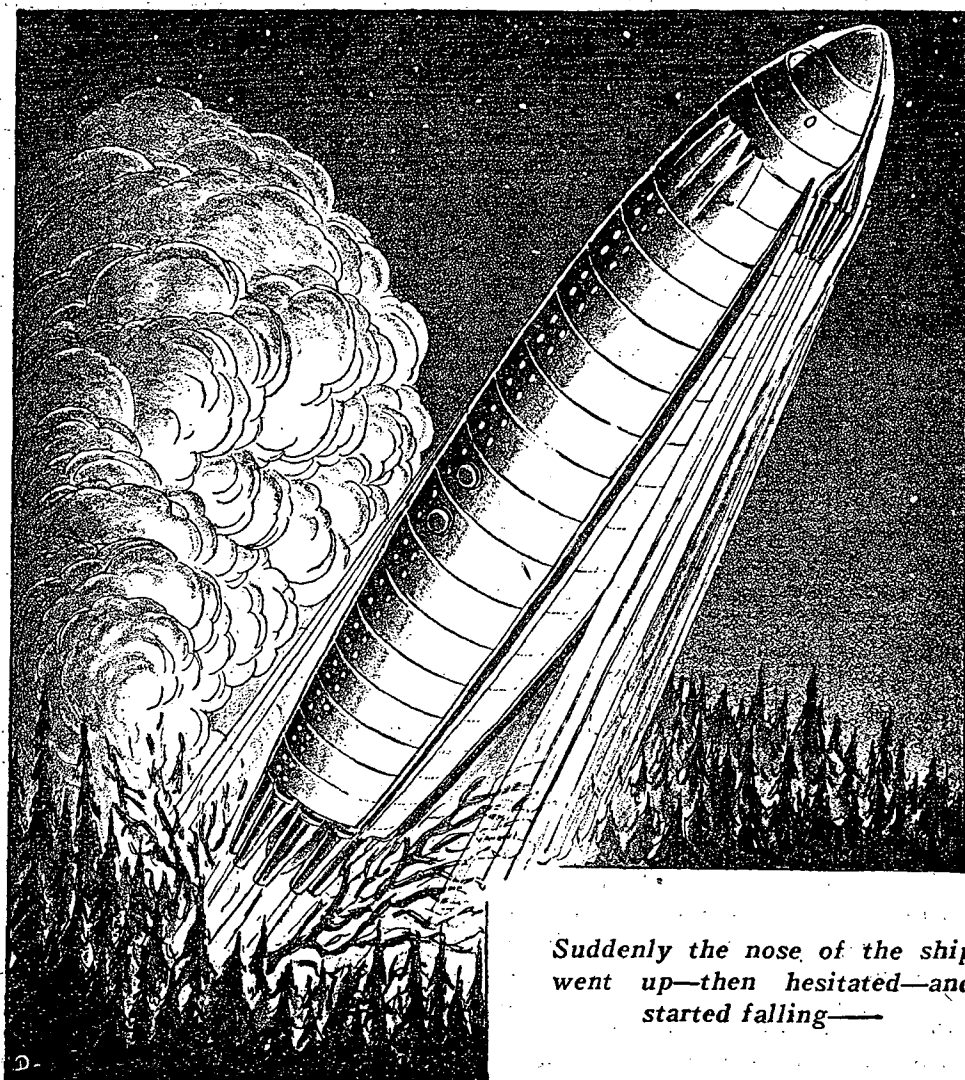
fore they could see any official. The man who informed them turned a switch on a cabinet in the corner, and they spent the evening enjoying a play. Both pictures and sound were reproduced in the one piece of machinery.

It almost seemed like magic to the little party who had never seen anything of the kind. The Combine had never carried on research in the direction of entertainment; it was considered a waste of time. They were too busy

driving men toward the bigger mechanical things.

The evening ended all too soon to suit them; they turned away from their entertainment with real regret.

They were called early by servants who brought breakfast and informed them to be prepared for an audience immediately following. It was a strange country. They accepted things without question, although it was very different from the reception that would



*Suddenly the nose of the ship
went up—then hesitated—and
started falling—*

be accorded subjects of the prince at home.

When they were ushered into a room of moderate size, to wait the pleasure of a man who had been an enigma to the Combine for many years, their nerves were at the breaking point. What would the reception be? Would they be welcome—or condemned as enemies?

They weren't waiting long before a young man, in conventional dress, entered a door at the side. He stood as if undecided for a moment, then stepped forward. "Are you the people waiting to see the prince?"

Randall answered, "Yes. We've come a long way as his guests and hope to thank him for the kindness. Our ship smashed up only a couple of hundred miles from your country. We thought it would be wiser to come here than to head for our own country. We sincerely hope we haven't caused trouble and hope we can be friendly, rather than considered unfortunate enemies."

The man seemed trying to keep from laughing before he spoke again. "I'm sorry to tell you that the prince is away unexpectedly, but I'll try to entertain you. I have some authority here and can throw the palace open for your pleasure. If you'll follow me I'll gladly show you around."

When their guide said his name was Peter, they were all introduced by their first names, which seemed to be the custom. When Gorna was introduced, the man glanced up as if startled, then gave her his arm.

Several times they passed guards in the corridors. Guards who stood stiffly at attention while they went by. It was certain the man with them was of high authority.

Their tour didn't cover any of the mechanical equipment but merely rooms of no importance. Peter seemed to have

forgotten every one but Gorna. He addressed his remarks to her.

It might be custom to address a woman, but the men couldn't help feeling a chill when they thought how things would change if he found out she was the commandant's daughter.

WHEN they reached the small landing port in the center of the building, Randall realized he stood at the threshold of his dream. His brain raced for some means of stealing one of the ships. If he could get this man on board, they'd stand a good chance of escape.

A small flier with sleeker lines than usual, stood at one side. It must be a private ship of the prince. Certainly it would be the fastest. When they were led on board, the others glanced toward Randall, expecting him to act. Gorna and Peter were completely engrossed in each other, hardly realizing any one else was there.

The men dared not examine the machinery, which was all strange, but followed as though they'd never seen a space ship before.

Randall was tempted to jump on the man, when Gorna stopped any attempt by speaking, "Oh, I wish you could take us up. This ship looks so interesting, and I've heard your ships were so fast."

Randall held his breath to hear the answer. Then his heart leaped to his throat—everything was working to perfection! Gorna hadn't realized what she was doing, but it did the trick.

The man seemed pleased about something. He looked around at the very innocent expressions before answering, "Why certainly, Gorna. I don't think the prince will mind at all if I take you up. This is the fastest ship in the fleet, *nothing* can come near it for speed."

Randall watched like a hawk as their host moved the levers, to take off.

When the ports shut, a small group of guards ran toward the ship, but a wave of Peter's hand sent them back. They weren't all as trusting of the strangers.

To their relief, Peter explained every action of the ship and the various control levers to Gorna. His explanation was clear enough so there wasn't the slightest possibility of mistake when Randall took over in the air. It was only a question of waiting until they had the fastest ship in the universe at their command.

Instead of taking off as the Combine ships did, on a long runway, this ship rose vertically several hundred feet, then went forward with perfectly smooth momentum. There were no jets to drive it. But strange force pushed it forward at several times the speed any of the men had ever seen.

They headed into space. Within a few minutes the Earth began to grow smaller. They'd covered distance in minutes the men were used to taking hours for. They marveled at the perfection, and were so spellbound they almost forgot to act.

VIII.

SUDDENLY Randall stepped forward, hurling the man away from the controls. The others caught him, while off balance, making him captive. Taken so completely by surprise, he put up little resistance, but displayed more interest in what was taking place.

Gorna tried to interfere, saying it was mean to treat a man that way when he had taken them up at her request. But Randall stopped her. It would do no harm for the man to know who she was now, and eliminate any feeling of remorse between them.

"You know, Gorna, that our whole aim in coming to this country was to steal a ship, and you, as the commandant's daughter, certainly can't hesitate to be free of it."

She was quiet for several minutes before answering.

Peter sat where they bound him, examining her carefully. It must be a terrible shock to find he'd been leading the commandant's daughter around the palace. This trip might mean a charge of treason for him, if he returned alive. But he did not seem greatly worried.

A trip that Randall knew would take months with an ordinary ship, could be covered with this in days. He felt real pleasure in the touch of the controls.

Gorna found the supplies, and served them a hot meal, but she was strangely quiet. They found their prisoner so well behaved they untied him, telling him why they had stolen the ship. It would be foolhardy for him to try and overcome the other men. They were all armed from the storeroom, and had locked the remaining arms up.

They locked him in a cabin during the time that would have been night on Earth, making sure there was nothing he could use for a weapon. Everything had turned out so simple, when they expected real difficulty getting away from the Earth with a ship. They all felt a little sorry for the way they had acted after the reception the country of the prince had afforded them.

They passed a Combine ship soon after they had slept. Randall wanted to signal and transfer Gorna, but she would have none of it.

"You're not going to get rid of me that easy! I started this trip and I'm going to see it through. I have as good a right as anybody to choose what I'll do, and it's *not* to go back to the Combine. At least, not yet."

This ended any thought of her return, as they headed farther into space—to the prison planet. It would take days for the trip, even with this super-ship, and the planet at the closest point of its orbit. Without more arms, it

might be a terrible task to rescue Mr. Borden. This kept Randall worried most of the time.

ABOUT NOON they noticed Peter making peculiar motions, and it gave them a funny feeling of impending catastrophe. At first they wondered if they were going to have a crazy man on their hands, still he seemed perfectly normal. It held Randall's attention for a few moments. He let the ship travel of its own accord by instrument. Their destination was plotted and the ship could hold the course for hours, without guidance, if necessary.

When he faced the visiplat again, he noticed something was wrong! The Sun seemed to be changing position in the sky. Then the truth struck him, and he tried to swing the ship back on its course. It went on making the huge circle—completely out of control! The former controls were lifeless.

A cold chill crept up his spine, as the full portent of it took form in his mind. They were helplessly doomed in space! Something was wrong; they were powerless to fix it. The man with them certainly wouldn't help.

Possibly, in time, they would be located by ships of the prince, but it would mean the end. He finally informed the others of their plight. While he talked, he caught sight of a grin on Peter's face and turned to face him.

"Well! Can you tell me what the matter is? If the ship stays out of control we may never see *any* planet again."

For a moment the man laughed out loud, then he answered. "There's nothing to be very much excited about. We're just returning—to the port we left! I decided we'd gone far enough and they're drawing us back. You see, our ships are slightly different from yours. They can be controlled from the home port without any effort from

their own controls. This saves us many lives which might otherwise be lost in space.

"We'll be back by dark, as the power that drives us is located at home, and when they draw us back it is much more powerful than when we are coming away. I'm really sorry that I have to disappoint you about going after your father, but it may turn out all right. You see, the commandant's daughter is a prize I wouldn't let out of my grasp without a fight. If it hadn't been for her, things might have been quite different."

Every dream was smashed. They were playing with equipment they knew nothing about, so far ahead of the Combine there could be no comparison. The six men sat around with a complete lack of hope.

Peter seemed genuinely sorry, and tried to brighten things up by explaining some of the mechanics of the ships. He had no hard feeling toward Gorna, but displayed strong friendship toward her instead. The others seemed of little importance to him.

IX.

THE SMALL SHIP dropped into port as dusk was falling, true to the word of Peter. They had been away since the morning before. Now they were back to face the music. There was no resistance in the men as the guards came on board and chained their wrists together. There was no hope. They had reached the end of the trail and could look for no mercy, after their actions.

Peter went ahead with Gorna. The guards didn't pay much attention to him. The men were relieved to see that he was not going to be punished for their theft of the ship. Everything in this country was so strangely simple—yet advanced! They were so far ahead of the Combine in mechanics that these

men who had thought themselves great spacemen felt bewildered.

They did not see Gorna again, until they were ushered into a huge chamber to face the man they had heard so much about, and had been taught to fear from childhood. From his position they knew they were facing the prince at last—a little man—with thin, sandy hair—and lines of laughter around his eyes which sternness could not kill.

For many moments the six men stood in humility before him, while he looked them over. They expected no mercy. They would take their punishment standing up. Gorna was standing a little to the side, near Peter. Finally, Prince Hamin spoke softly, rustling a sheaf of papers that lay on a pedestal beside his ornate chair. His long, dark cloak moved as he pointed.

"Randall Borden, you have committed a great crime in trying to steal one of my ships. I hardly know how to deal with you. Unknown to you I have had you watched from the time you crashed your ship until the time you entered my empire. The only redeeming thing about all your actions is the fact that you weren't trying to steal the ship for the Combine. Instead you were taking it to thwart one of their plans by rescuing your father. In this I was pleased, as you showed more backbone than I thought there was in the whole Combine. But you made a sorry mess of it." The prince donned nose glasses and scanned his notes further, then looked again at his prisoners.

"If it wasn't for a man who has been pleading for you, I might be tempted to deal with you as an enemy. He has asked me to deal lightly with you, so I am going to turn you over to him for sentencing. I don't think he will be unfair. It is his problem from now on. I wash my hands of the whole thing.

"Also, it might interest you to know that the man you kidnaped was my son

Peter. He may want to deal with you himself, and has every right. But he will probably be lenient, as it was he who had every action you went through planned in advance.

"He had prepared the farmer for your reception hours before you arrived there, and has used you as actors in the play ever since, to see how far you would go to accomplish your purpose. We have equipment that can picture every action that takes place in the world; we know every important happening in the Combine.

"This sometimes causes me to act in certain ways that I would not otherwise, and I have been very much interested in your struggle to reach your father.

"I am going to turn you over for sentence. I sincerely hope your judge may be lenient with you. The men with you were merely following your directions. I don't consider them to blame. Here is the man to punish you. I know of no one with a greater right."

Randall caught a fleeting smile on Prince Hamin's round face as he finished speaking, then turned to face his judge. For a moment he was speechless, then words burst from his lips in a torrent.

"Dad! You? How did you get here? Oh, I'm glad to see you!"

After a moment, Randall turned toward the prince again. "Do you mean, sir, you're going to leave my sentence to my father?"

"Yes, son. He suffered a lot from the Combine, and deserves a little consideration from me. He decided to join our country's technicians and work for us. We can always use such ability as he has displayed. We have given him every right of a citizen here."

This was more than Randall could stand. His voice broke before he could say anything. His father led him away, to tell of the release from the

prison ship by a ship of the prince. It was at his request that they cruised alongside of the liner, so he might have a look at his son. The prince had allowed him to follow every movement of his son from the time the liner reached port. They were on the verge of going out to the wreck, when they saw the seven adventurers were safe.

A MONTH LATER Randall went into space as a junior officer on board one of the ships of the prince—serving what turned out to be a democracy rather than an empire.

The prince was head of the government but took no great authority into his own hands. He was the one man who did not mix in politics. He could dismiss any member of the government for action that was not to the benefit of the people.

Each of the other men had been signed to a ship and would work their way into good officers' berths before very long, with their knowledge of space. They had ended up far different than they expected when they took off months before on the strange trip one night in the stolen Combine ship.

Gorna had to be returned to the Combine. Prince Hamin insisted on it. His son had grown very fond of her; she returned his affection. But it might lead to trouble between the two nations, and his father did not want to take any chances.

They notified the Combine that she was safe shortly after her arrival. But her return had been put off several times. She was enjoying her stay and was far from anxious to get home again. Prince Peter had taken her to every place of amusement in the capital city; they spent many hours together. Even the people of the city had taken a liking to her. They gave her great acclaim everywhere she went.

Finally, at his father's insistence,

Prince Peter took to the air with his flier, to return her to her home. It was tearing his heart out. His father hated to see him do it, but there was no choice. Several of the subjects, or citizens, petitioned the prince to allow her to stay, no matter what the consequences, but he turned a deaf ear. The Combine was getting anxious and talking of trouble.

The commandant was waiting when the small ship dropped into the port. As Gorna stepped out he threw his arms about her in the first real embrace she could remember. The story of the men who left them to serve the prince caused great anger, and they almost forgot to treat Prince Peter as a guest.

They took him through the city, showing their marvels of building culture; but his mind was with Gorna. Life had been a great adventure in her company, from now on it would be empty. The officials, once started, outdid themselves to be nice to him. They had not forgotten their last encounter with his country. At his request they set a guard over the ship and allowed no one within several feet of it, although they were burning with curiosity to know its secrets.

Three hours later he stepped back on board his little ship, leaving his heart irrevocably in the Combine. It was bitter to think fate made him fall in love with the one person with insurmountable barriers between them. It was hopeless; he had to admit it.

HIS LITTLE SHIP settled in the port after tearing through the atmosphere at top speed. For the first time he had opened it to top speed. It was dangerous when traveling within a few miles of the Earth, but he didn't care. It seemed to relieve his feelings to a certain extent.

As the port opened and he started to step out, his father came forward.

"What have you done? The Combine is arming furiously and will attack us as soon as they are prepared! There is nothing now that can stop another war!"

"Why, I haven't done a thing, father! I left Gorna at their port and returned here."

"You left her? I have not been watching your ship, but I took it for granted you brought her back with you. From the flashes, the Combine thinks you have brought her; there is no stopping them now. -Public feeling is running too high."

Suddenly a sob behind Peter made him turn. Gorna stood behind him. "Oh, it's all my fault! I stole back on board when he was ready to take off, telling the guards I had forgotten something. If I have caused war I— But I *couldn't* stand to see him go and leave me! Maybe he had better tell them, or let me talk to my father, and then return. He won't attack you if I tell him I stole on board of my own accord!"

"Come with me!" said Prince Hamin. "We can try it."

Gorna spoke to her father, and pleaded with him. Every big broadcast of the type was sent out over the whole nation. The citizens in every corner of Australano heard the appeal. Their

hearts went out to the girl who was unafraid to tell of her love for their young prince. Shortly an answer came from Commandant Makin, her father.

"I don't believe you! I would not trust that young prince any more than his father! The Combine is going to exact payment for the treatment of my daughter!"

The sigh from the citizens of Australano was almost audible. *He had insulted their prince and his son!*

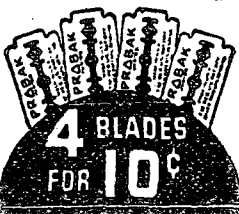
The prince shut off the broadcast before it could do any more damage, but it was already done. The public would not return Gorna now, as long as they could protect her.

For a moment the prince watched the tears streak down Gorna's face, then he drew her to his arms. "No, child. I can not separate two people who care for each other as you do. And all the people will stand behind me. If it means war, we must have war."

"They are very foolish, as we have equipment that can cut them to ribbons, as we did before. But I have work to do."

"Peter, you will be married immediately, then prepare your ship to join the fleet. We will call on the Combine before they start this time, and possibly stop a great deal of damage. This foolishness has got to stop once and for all."

*The Odds Are
Against You*



WHEN YOU BUY THE *unknown*

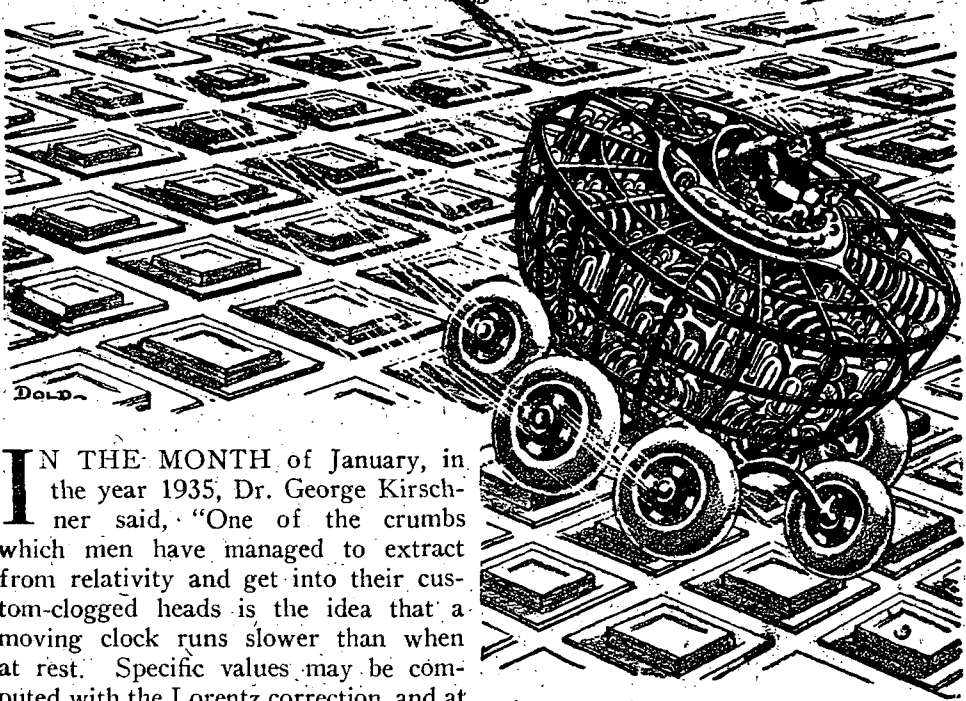
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PROBAK JUNIOR

The TIME Decelerator

by A. Macfadyen, Jr.

*Now it seemed that he had
skipped forty years! Four and
forty— Four was the square
of two—and the universe was a
union of four dimensions—*



IN THE MONTH of January, in the year 1935, Dr. George Kirschner said, "One of the crumbs which men have managed to extract from relativity and get into their custom-clogged heads is the idea that a moving clock runs slower than when at rest. Specific values may be computed with the Lorentz correction, and at the velocity of light a second would never end. Since time, as we know it, is really change or causality, and since a clock merely measures the rate of change, what is meant is that the rate of change is a function of the velocity of the system referred to.

"Thus a quantity of Radium A, at

low velocities, has a half-life period of three minutes. At 161,000 miles per second, its period would be six minutes, and at the velocity of light the period would be infinite; the radium would never decay. Thus the speed of physical processes and events varies with the velocity of the reference system. This

is true of living processes, of course. If a man were to travel at the velocity of light he would never die——”

In June he said, “The discovery, by mass spectrum analysis, that mass was a function of motion, upset the classical dictum that gravitation was a function of mass. And the view of Einstein and others that distances varied with the velocity of the observer similarly threw light on the previously unquestioned principle that gravitation varied inversely as the square of the distance.

“From these premises Einstein made the deduction that motion and gravitation are exactly and ultimately equivalent, that the phenomena each give rise to are wholly identical. Consequently, time is a function, not only of motion, but of gravitation also, and the speed of a chemical reaction, for instance, varies inversely as the intensity of the gravitational field in which the reaction takes place. Johnny, do you remember what I said months ago? Then, under the influence of a suitable gravity field, a man would never die——”

In January, 1936, he said, “The control must be independent of the G-field, or it will be subject to the lengthening of the time interval also. You’d go up, Johnny, and never come down—— What’s the answer?”

In February, Dr. Johnny Latimer, the one to whom all these remarks had been addressed, and the only other person now present in the big laboratory, frowned again at the strange device which had occupied their attention for thirteen months.

The rigid, welded framework of steel tubing formed a hemisphere fully ten feet across the flat top, or diameter, and, mounted into complicated mass of cross braces, struts and supporting members, was an equally complex assembly of electrical apparatus.

There had been no room for the thing on any of the benches, so a space had been cleared for it on the floor, and it

rested there on its six air wheels, like the top of an inverted mushroom. He let his glance move among the coils, valves, huge condensers and transformers, and found the maze familiar, now. There was the seat in the center of the top, a nice comfortable seat with pneumatic cushions, and the complex switchboard mounted in a semicircle about it.

On the board were devices which showed the state, at any instant, of any of the dozens of separate mechanisms which combined into the entire machine. There were potentiometers, ammeters, and switches inserted into the many separate circuits; pyrometers to indicate the temperatures of the huge oscillator tubes, and, most important of all, there were the dozen or so instruments which controlled and registered the G-field.

LATIMER mounted the network of steel, placed himself in the seat and smiled gently at his companion—the inventor of this device. “Shall I move it outside?”

“Yes.” Kirschner moved to the wall and threw over a heavy switch. Electric motors whined into life at the other end of the big laboratory. The two huge doors separated silently and Latimer, at the controls of the machine, closed a switch and grasped a rheostat. On its six wheels the strange vehicle rolled forward, passed beneath the roof, and came out upon the cement driveway, into the warm sun of July. It turned off the driveway and moved on over the close-cut lawn, its huge tires leaving no impressions on the creeping, bent grass. Some fifty yards from the house, Latimer stopped, close to another queer device resembling a complex searchlight, but that the huge parabolic reflector was built not from silvered metal, but from many-strand copper wire.

As Kirschner examined this other device once more, Latimer turned in his

seat, and stared again at the low, rambling white house to which his companion had retired three years previously, there to pursue independent research in chemistry with Latimer as his chief assistant.

Exactly why Kirschner had left the university, the engineer still was not sure. His patents brought him an enormous income; yet it barely covered his research expenses. It was true that there were no classes to take up a small fraction of his time, yet there was also no convenient board of trustees, who could be expected to grant any appropriation within reason, such was the reputation of the gray-haired scientist. But Dr. George Kirschner was colossally independent.

New York City was but twenty miles distant from this house, yet the grounds were amazingly extensive. Fifty yards away the trees began, and continued for a hundred yards to the garden wall. Beyond the garden wall was Number 9 highway. Among the trees, in cleared spaces were several greenhouses.

He brought his attention back to his surroundings when Kirschner said, "I think we're ready." He made a minute adjustment. "Remember a hundred feet of altitude, exactly. If you get beyond the radio beam, or away from its path, no one knows what would happen."

He stepped close to the machine, reached across the maze of apparatus, and gravely shook hands with Latimer. "I think there's no danger. In fifteen minutes I'll bring you down again, and you will have known what it is like to have traveled in time."

Latimer grinned at him suddenly. There was no danger that he could see, either. He said, "O. K.," and before the older man could reply, grasped his switches.

The machine rose smoothly into the air like a silent elevator, to stop and hang motionless when the gravitational altimeter indicated that its height was

a hundred feet, exactly. He looked over the side, down through warm air and sunlight and saw the foreshortened figure of Kirschner, staring up at him.

He examined his switchboard carefully, waved an arm and called, "Here she goes!" and closed five switches, the switches which controlled the G-field, that peculiar structure of force of the same nature as gravitation, yet whose influence was locked into a closed sphere. Had the effect not been confined in this manner, the earth would have been disturbed in her orbit, such was the intolerable power generated in that relatively small mass of apparatus.

As his fingers moved the last switch between its silver contacts there flashed about that hemispherical framework and its operator what appeared to be a perfect, continuous concave mirror. It was as if the machine had been suddenly transferred to the center of a hollow sphere, whose sides were silvered with incredible perfection. It was the boundary of the G-field, forming an impenetrable barrier to all actions, and lengthening the time interval of all physical events within its radius.

An unimaginable lethargy fell over Latimer's brain. He attempted to unclasp his fingers and remove them from the last switch. From a great distance he watched his fingers, waiting for signs of the motion which should respond to the command of his brain. As he watched them they seemed to recede into infinite distance, and across a darkening void he saw the tips of them uncoil, slowly. Then his brain sped with accelerated velocity into the void and complete darkness closed about it. The time interval of the reference system which was his body and the machine had lengthened until a second with respect to it would never end. He knew nothing more.

A hundred feet beneath the machine and its operator, Dr. George Kirschner stood, one hand grasping a stop watch

and the other the switch, whose closing would send a series of short-wave impulses to the heart of that machine poised in the sunlight, and cut off the G-field. Two minutes before he had watched the strange framework, with Latimer seated in its center, slowly fade from sight until complete invisibility shrouded it. Where it should have been, there was now merely warm air, sunlight and the blue sky.

Dr. George Kirschner frowned at his expensive stop watch and waited—

LATIMER'S RETURN to the spatial system which the earth constituted was without abnormal incident. There was simply a reversal of those events which had preceded his unconsciousness. It was a strange experience. As the physical processes of his body and of all the matter under the influence of the G-field began to speed up once more, his brain, or consciousness, headed back across that void into the depths of which it had seemed to vanish. Across a shrinking distance he watched his fingers unwrap themselves from the rubber of the switch handle, and was aware that the darkness about him was lifting.

And then, abruptly, the last darkness fled, his hand dropped away from the switch and he was sitting in the center of a strange machine immersed in warm sunlight and air, beneath a blue sky. He finished the drawing in of a breath he had begun, as he thought, some fifteen minutes before, and looked over the side of the machine, down toward where he should see Kirschner.

But he saw no Kirschner, no lawn, no house, no short-wave directional antenna.

He saw only a low hill covered with low verdure, several trees and some long, untended, ripe, green grass. About the hill, stretching to the distant horizon haze, was a calm countryside, with verdure, trees, and ripe grass, untended.

It all had a strange appearance of intentional disarray, as though planned by those who desired pleasant disorder.

Latimer slapped his face so violently that tears came from his eyes. He was not dreaming, then, or was in a dream so veridical that he could never hope to get out of it. He said, "What the blue Sam Hill——" and stared and stared—

He turned back to the control board and began adjusting voltages and making connections. The machine, at its altitude of a hundred feet, sped off across the calm landscape, the air-speed indicator moved over to the thirty-mile-an-hour mark. It was possible that, somehow, the machine had moved of its own accord away from the house, and that Dr. Kirschner waited in perplexity at no great distance. In which event, how in Heaven's name had he come back to earth time?

He stared at the earth speeding past beneath him. Such a country as this he had never seen in any part of the United States. It was like a colossal, endless, abandoned garden. Over on the left something white kicked up and fled away; it was a cottontail. Latimer had never seen a wild rabbit before, in thirty years. He twisted in his seat, surveyed the rolling, tumbling green and brown, the occasional flashing white of scattered birch and spruce.

As the machine sped silently over the green hills and flats, Latimer understood what a remarkable device it was, which could not only leave time behind, but could also travel with ultimate convenience in space. The propulsion he understood; the G-field, at reduced power, interacted with earth's own gravity field, and the resulting reaction supported the craft in the atmosphere. Forward motion was obtained by allowing the craft to fall "downhill" in a straight line, like rolling on an inclined plane without the plane.

He passed over a tiny lake set like a jewel among the hills, and was nearing the slopes which swelled away from its farther edge when interruption came. There was a strange high whine from behind him, and a second air machine drew up by the side of his speeding craft, keeping pace easily.

IN A GLANCE he saw that it resembled an autogiro. Spinning rotors supported it; there was an air screw on each stubby wing, invisible in strangely silent speed.

A hard-faced man with black-clad, wide shoulders put his head through an open window and yelled, "Pull up, guy! Where the hell do you think you're going?"

Latimer stopped his forward velocity, and the plane slowed with him, a dozen feet away. Both machines hung there in the air, one motionless, the other hovering easily. Latimer called, "What do you want?"

The hard-faced man spoke to an invisible companion in the cabin. "He wants to know what we want. The lug!" He spoke across the gap. "What's the name, brother? What's that thing you're riding in?"

Latimer was not unwilling. "I'm John Latimer. What's the date?"

"May fifth. Toss across your iden."

"What year is this?"

"1940. What the hell's the matter with you? Let's see your iden. Snap it up!"

1940! Latimer stopped thinking for a moment. 1940! What had happened? Kirschner should have brought him back, yet Kirschner had not. Then, how had he come back at all? What had awakened him?

The fellow in the plane whispered something and his shoulders moved. "Last chance, brother, where's your iden?"

"What's that?"

The hard-faced man jerked back from the window, and Latimer had a brief flash of a stubby thing with a ridged barrel in his hands. It kicked and roared violently, and the air about him was suddenly filled with crackling, sputtering streams of visible smoke.

Without thinking, Latimer huddled in his seat, and his hand moved on the forward switch, which it had never left. The machine leaped away, and sped with rising speed over the green earth. There was a yell behind him, and he glimpsed lightning-smoke trails in the air to his left. He slued away, and advanced the rheostat to its limit, wondering how long his batteries would last.

He looked back and saw not one, but five planes whining in his wake. They would soon be within accurate range again, for his own speed was limited by the weight of his machine, since it functioned with the aid of earth's gravity. He cursed violently.

In a few minutes the leading plane was smoking the air about him with invisible, miniature shells, which came ever closer to their mark. There was absolutely nothing he could do about it. To land was impossible, simply suicide. Nothing he could do—There was one thing! He had come back to earth time once, with the assistance of some power at present wholly beyond his comprehension. He might do it again; even so, possible eternity was preferred to certain death.

Smoke streams were spitting and crackling about the machine as he carefully closed the switches that controlled the G-field. That concave mirror flashed about him again, then lethargy fell and darkness closed in. Great fingers, slow and heavy and deadening, shut over all his movements, and there was a weight upon his brain. Then there was only an eternal void of darkness—

AST-2

HIS CONSCIOUSNESS struggled against a slowly lifting haze which obscured his thinking, and his eyes fought a thinning darkness which hid his surroundings. His body seemed immeasurably heavy, but its normal lightness returned after a long time; it seemed long, at least. Finally, though, he conquered the incubus and haze and darkness lifted. Again, miraculously, he had come back from the limbo of eternal, infinite time. Some outside agency had interfered with his machine, which he and Kirschner had thought inviolate, and had brought him back to the spatial system of earth.

There was only time for this brief thought to flicker in his brain before, with a faint sense of anticipation, he looked about him.

This time he hung above a vast and endless area of small, white, flat-roofed buildings, set among streets and roads which seemed to have been laid out by a geometrician, in rectangles, squares and triangles—curves having been ignored entirely. The buildings—dwellings by their appearance—were as unvarying as the streets; all were identical within the limits of his vision; they were merely embellished cubes.

The treeless roads were bordered with the green of close-sheered grass, and there were figures walking about on the glaring-white under the powerful sun and the faint-blue sky. It was like an exaggerated suburb, and the eternal order and discipline had something unpleasant and distasteful about it. Definitely, he did not like it.

He twisted in his seat, and stared from his height in all directions; but the city persisted to all four horizons. He turned back in time to see an air machine bearing down upon him, and caution caused his hand to tighten on the first switch of the G-field bank.

The plane sped up and stopped on invisible rotors, little changed from the machine of his other experience, save

that a certain refinement was apparent, a smoother moulding of the motor fairings, even stubbier wings. He felt a sense of duplication, when a window slid back and a head frowned at him.

Latimer stared back, across the few feet of intervening air, and saw that the eyes of this man had weariness in them, that there was a looseness, as of fatigue, in the muscles of the face. He spoke first, "What year is this?"

"Lost your memory?" The inquiry was slow-spoken, as though the fellow would not be surprised at almost anything. "This is 1980, friend, and I want to see your token. Flash it, will you?"

It was 1980! Latimer, little surprised now, was struck with a new thought. He had slept, the first time, for four years. Now, it seemed that he had skipped forty years. Four and forty. Four was the square of two, and the universe was a union of four dimensions.

"All right, brother," the sad-faced man was mild and patient, "come out of the fog and flash your token. I've other things to do, and I don't want to get tough."

"I haven't got a token," Latimer said. "I don't know what it is, and I want time to explain. Who are you?"

"He hasn't got a token," the fellow said quietly to a companion in the cabin. "Flash a call, will you?" He turned back and said to Latimer, "Last time, friend. Will you show your token?"

"I haven't got one."

The weariness left the slack features, and the fellow snapped, "You damn fool, do you know what you're saying?" Abruptly his head withdrew and there was a gun there instead.

But Latimer was prepared, now. He threw his body flat and pulled at the switch. The machine leaped away from the plane and the smoky streamers which now spurted from it, in jetty rib-

AST-3

bons of death. Even the gun was the same, and Latimer wondered, as the machine sped away above the changeless and endless dwellings, if the fellow had been lying about the year, lying reasonlessly. It seemed unlikely.

He looked back and saw not one plane, nor five, but eight machines speeding with rapidly rising velocity after him. He cursed again and considered landing, hunting refuge among the buildings, and decided against the attempt, for it was an unfavorable world to be stranded in.

And so, as the machines were almost within range once more, he closed the circuits of the G-field, and gave himself up to darkness and heavy, lethargic oblivion—

HE AWOKE, for the third time, to hard sunlight and a blue sky, and was dimly puzzled, for in three attempts the laws of chance indicated that he should have returned to darkness and night at least once. That he should have come back to sunshine and a cloudless sky, three times— He looked down and about the machine.

The strange white buildings no longer spread in duplicate over the land, instead there seemed to have been a reversal to the scene of his first returning, in 1940. There were rolling hills and flats, strewn with the thick green grass, currant bushes, scattered trees and a small lake in the distance. The cycle had moved again.

He had skipped four years, then forty. It would now be the height of perplexity if, this last journey, he had been away for four hundred years of earth time. There was obviously a factor which neither he nor Kirschner had foreseen, a recurring variable like the displacement of the perihelion of a planet, which in some manner was able to cut the field of force which they had called the G-field. Yet why should this

factor move in obedience to the decimal system?

He closed a switch, and the machine started forward smoothly, picked up speed and fled over the green land fifty feet beneath. After a while he came upon an incredibly wide road, white-surfaced, and altered his course to follow it into the east. Speeding above its amazing width, fully a quarter of a mile, he examined its length ahead until it was lost in the blue horizon shimmer, eager to see signs of movement upon it, signs of anything.

He increased his speed until the wind whined through the struts of the machine, tore at his hair and whipped the laboratory smock which he still wore. After a few minutes he picked out a speck on the road ahead. At closer distance the speck became double. It was a small vehicle, mounted on two huge wheels, and there was a figure pulling it.

He set the machine down upon the white road and got out.

The figure stopped and looked up as he came across and smiled cheerfully at him. It was, he saw, a girl dressed in a light cloak and a cross between sorts and his conception of a Scottish kilt. She was tall, with wind-blown black hair, and possessed a certain beauty which he could not define.

Latimer said, succinctly, "Stuck? Want any help?"

She said, "No, thanks," and looked calmly past him, at the machine resting on the wide road. He watched her eyes scan it swiftly and intently, then swing back to him, and saw that they were puzzled and surprised.

"A field machine!" she said. "And so old that it must be the grandfather of all field machines. Did you come in that? Where did you get it?"

"I helped to build it," Latimer told her, "and I think I've come farther than I intended. What year is this?"

"Don't you know?" The girl was

surprised. "This is 2380. How far have you come?"

There it was—twenty-three eighty. It was the cycle again; four, forty, four hundred. The machine, he thought, must have a screw loose; there must be a fault in it. Perhaps the radio waves which should have shut off the G-field after fifteen minutes of operation, earth time, had been twisted by some warped freak of time and space, something that built up to a potential, like the rising charge of a condenser, and periodically interfered with the mechanism.

"I have come exactly," he said, "four hundred and forty-four years—"

"Four forty-four!" the girl exclaimed. "1936— But that's impossible, you must be mistaken. The curve field wasn't developed until 2060, and the field machine is even more recent—2210, I think. It's impossible."

"That machine," he said firmly, pointing to it, "was developed in 1936, by Dr. George Kirschner and Dr. Johnny Latimer. I am Latimer, and I have come in it against my will. If this is 2380 I have skipped four hundred and forty-four years, and I would like to get back if only to find out what happened to Kirschner, who was a friend of mine."

"You can't go back." Slowly she shook her head. "The curve field operates in one direction only, as you probably know. The interval can be lengthened, but it cannot be shortened or reversed. We have had it for a hundred and seventy years, but few have ever dared to skip more than a dozen years, or less, for it is difficult to control at higher velocities. What are you going to do?"

WHAT could he do? Latimer reflected that another leap forward beyond time might be embarrassing—it would be four thousand years this time, if his reasoning was correct.

"The G-field," he began, "or the curve field, as you call it—do you know all

about it? Are you certain that it works one way only?"

She was almost certain. "Although Veblen recently has said otherwise, I think. But I don't know all about it and my brother Lenar does. He might be able to help you. Would you like to come with me and meet him?"

Latimer was willing. He directed her to the seat of the machine and perched himself on the framework, within reach of the controls. She gave him the direction. He started the machine again, and as they fled over the green land he discovered that she was Mora Kessel, university student, living with her brother, who was an instructor somewhere.

He told her more about the enigmatically accidental—he had assumed that some mishap had occurred to Dr. Kirschner—manner in which his life had been transposed across the centuries, and discovered that there was a record, to which one resorted in such matters, but which had not been begun until 2010. Yet it might contain data regarding Kirschner, since he had been quite famous. The record contained the fingerprints and other material concerning all persons born since 2010—

He discovered, in turn, that she had been pulling the vehicle, no great effort since it was almost frictionless, purely for reasons of exercise. It was not self-propelling, being a sort of training shell. She was training for something or other, some type of racing, where it was necessary to possess sufficient physical strength to withstand sudden accelerations. Sport was violent and almost wholly mechanized—

He decided suddenly to visit and inspect the record, of which she spoke, before interviewing her brother Lenar. He was troubled with an intense and consuming curiosity regarding the fate of Kirschner. He was bothered with a faint sorrow. Accordingly, he ques-

tioned Mora Kessel and then altered his course, heading for the nearest branch of the record, speeding across a wide river which he failed to recognize, but which she said was the Hudson.

The branch which housed that colossal monument to organization, the record, was an enormous white, flat, low building, with dozens of huge portals. They landed on the green turf surrounding, made their way past banks of enormous flowers, passed along wide walks sparsely occupied by men and women dressed much the same—in the manner of Mora Kessel—and walked under one of the arched portals, into the cool of the building.

Sunshine flooded the place from heavy electron tubes girding the walls, and they traversed corridor after corridor. Moving floors and escalators, it seemed, had been turned down for reasons of health. Health and science were the dominant factors of this year and age of 2380. 'Latimer' saw hundreds of sections where enigmatic shelves and cabinets bore the numbers of years and months, and at last they entered a large room and headed for a distant shelf.

After careful scanning, Mora Kessel found the volume. Latimer took it, found the index and flipped the opaque, tough, metallic pages rapidly. And there it was—

George Sachse Kirschner—doctor of this and that—born 1885 A. D.—and so on. Latimer read on eagerly. Kirschner had died in bed! He had died in 1970, at the comfortable age of eighty-five, from "natural causes"! The mystery was thicker than ever. If Kirschner had been stricken during their experiment, only death would have sealed his lips regarding Latimer, still presumably hanging there in mid-air, in the sky. Latimer studied the ample account, in the small, clear print.

Kirschner had been educated at Munich and Princeton, was the discoverer

of the proton method for curing leukemia, by killing the excess white corpuscles, inventor of the direct-vision ultra-violet microscope and the infra-red device for examining the state of the moving blood in the veins and arteries three inches beneath the skin—and so on. Latimer had helped on the last two. There were others, some developed after 1937, about which Latimer knew nothing.

Puzzled, he flipped the page—and his heart skipped. There he was, *himself*! Under "Associates" there was the name, John Hervey Latimer, born 1905, educated Massachusetts Institute and so on—Doctor of Science in chemistry—chief assistant to Kirschner; it was all there. All but the date of his death—and the length of his term as chief assistant. In fact, the data was meager. Evidently he had not made much of a mark on the world—evidently he had never returned.

HE SIGHED and let Mora Kessel read it, then together they walked out of the building, and set off once more for home and brother Lenar.

Once they passed over a colossal manufacturing center, stretching for miles beneath the flashing machine, a great mass of white buildings constructed largely from tempered, bubbled glass, sprawling for hundreds of acres along the bank of a convenient river. He learned that those buildings were jammed with eternally moving machines, moulding and processing raw materials into synthetic food, machines which functioned in inscrutable silence, wholly automatic.

As Latimer stared down at this monument to science, he suffered a peculiar hallucination, enigmatic and disturbing. While the machine sped on over the distant hills and grassed plains, he thought he saw the sunlight visibly dim and darken, and became aware of a sub-

dued roaring, like the mutter of far thunder. For an instant it seemed that his brain was receding from his body into an endless void, he tried to unclasp his fingers from the switch and could not—

The sensation lasted for but an instant, yet time seemed to lengthen out, and just before the hallucination lifted he caught a momentary flash of his body, as though his eyes were outside it. His body was standing with wide-spread feet and head thrown back, and there were two spheres of radiance somewhere. It was like a nightmare; nothing was substantial. He had a foot in each, and the spheres were colossal things. Blood drummed in his ears, and he seemed to be standing between two worlds—

Then, suddenly, he was back on the machine, standing erect against the thrust of the wind. He was standing there in the sunshine and Mora Kassel was there also, her strong fingers holding his right arm tightly, and staring at him with perplexed black eyes.

"Are you ill?" she asked gravely. "You stood up and seemed to be going to faint. What happened?"

"I'm all right," he said. "It was something like fainting, but I'm not ill. I'm all right."

But as he spoke he felt the stirrings of warning somewhere in his brain, and was tormented by doubt. His own time was separated from him now, by many millions of miles of airless, heatless space. There was no such thing as time. Many things had happened while he had been gone, locked into eternity, and, for convenience, men had fixed the order of their occurrence by means of a device called the year. That was all.

But there seemed to be another factor; several times he almost grasped it but the thing eluded him. It seemed to evolve somehow from the thinking of Ouspensky, the conception of time as a static space dimension, with past, present

and future existing simultaneously, but perceived in succession due to the limitations imposed by the senses of the observer. The machine had been based on the effect of motion on time according to another conception—that time was simply the casual form of events: Kirschner had named it change; which amounted to the same thing.

His brain struggled with this for a minute. If time was static it was simple to conceive of traveling in both directions; if it was dynamic, merely the name applied to continuous causality, then it was difficult to imagine traveling in any direction but forward—into the future. He had simply skipped time, that was all, and had arrived at the future in a very rational manner. It was as if he had simply slept through it all.

THE remainder of the journey was without incident, and finally they came to her home, a low, green structure, squarish and flat-roofed. It seemed that the roof was the accepted place for landing, being braced and strengthened for the purpose. And then, as they were about to land, the haziness of Latimer's dread took on shape.

Again, darkness settled with slow wings about him, and there was a distant mutter, faint as though heard from behind a barrier. Latimer threw all his will against the lethargy which tried to stifle his actions, and his hands on the switches moved frantically. They thumped down upon the white roof with such violence that Mora was thrown flat on the framework of the machine, and Latimer heard his voice yelling, "Get off, Mora! Get off the damned thing!"

But the girl lay still, and Latimer, struggling against that darkness which threatened to engulf his senses, slipped an arm under her shoulders and picked her up. His brain was fleeing again, and across a distance he saw her cloak

catch on a projecting switch handle, and come away from her shoulders. His legs moved slowly; as he leaped down from the machine, on to the white roof, he seemed to float gently through the air. But when his feet touched the yielding surface, his legs seemed to die, and be of no more use than twigs.

They could not support his body at all. He collapsed on the roof, his grip loosened, and Mora Kessel slid and rolled away from him. The darkness was almost complete and the roaring violence was like a colossal, sounding voice. Through a dark haze he saw Mora come to her feet and leap toward him, with sudden, shocked realization in her eyes.

Too late!

As he half crouched there on the roof, fighting to get up and away from the machine, there was a gigantic tugging at his body, and instantly it seemed to snatch him back on the framework of that strange device. Then darkness closed in, and even the roaring voice was stilled—

HE RETURNED to consciousness as he had done before, but slowly and familiarly now. His eyes pierced a lifting, thinning darkness, and saw that his body was sprawled half out of the seat of the machine, and that there was a well-known scene around him. The

last wisps cleared, and he was able to look over the edge of the machine, down through a hundred feet of air and sunshine, and see the foreshortened figure of Dr. George Kirschner, staring up at him.

The gray-haired man yelled, in a cracked wheeze, "Come down, come down, for Heaven's sake!" Then his voice broke.

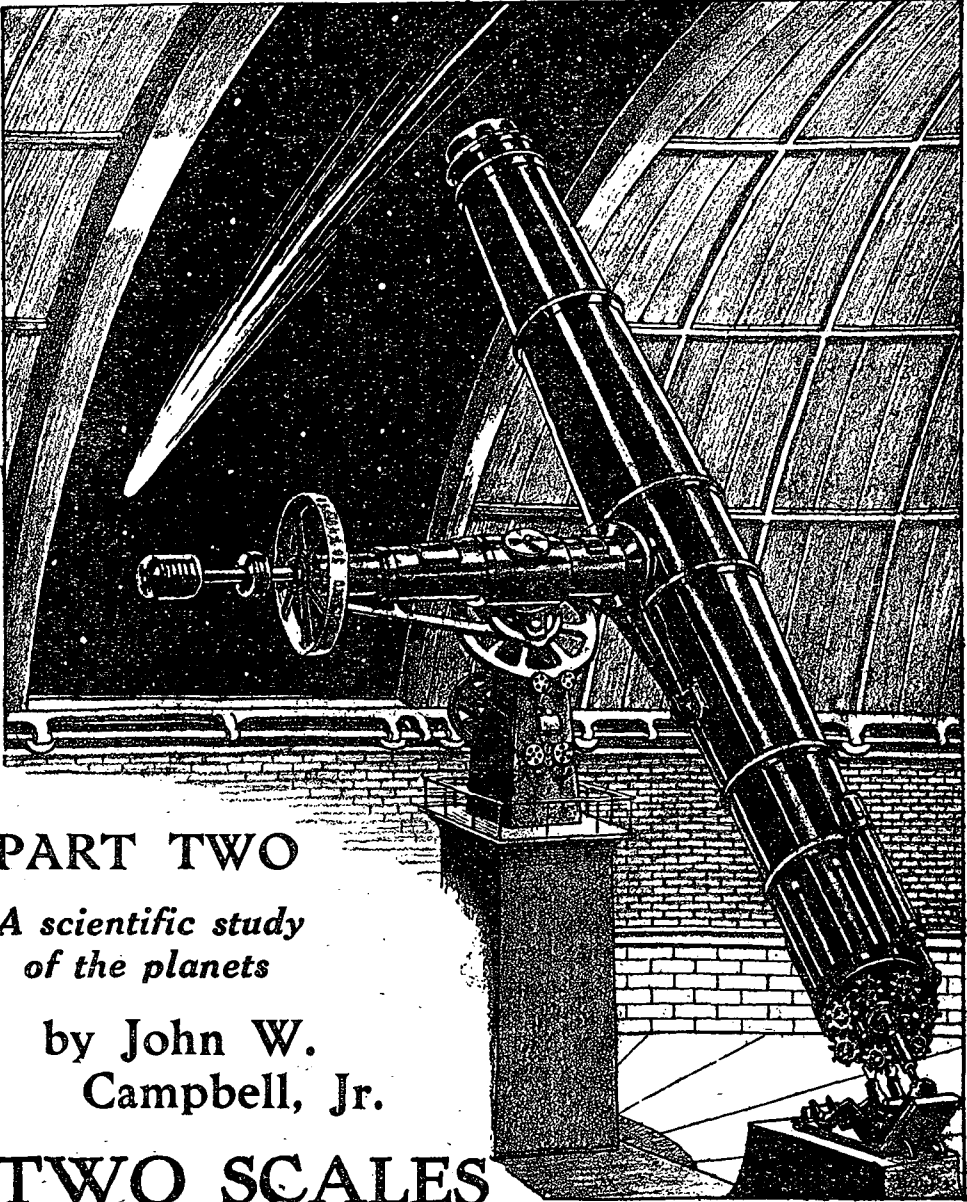
Without thinking very much, Latimer manipulated his switches carefully, and brought the machine to a gentle rest on the green turf, close to the short-wave transmitter. Kirschner ran up and, as Latimer stepped from the machine, gripped his arm powerfully and yelled, needlessly, "In Heaven's name, what happened? You've been away forty minutes, not fifteen! I've been yelling myself hoarse for a dozen minutes! Where the devil were you? What happened?"

Latimer said slowly, "There is a missing factor, doctor, in your conception of time, for causality does not explain the——"

And there was a driving voice within him saying, "I must get back. I must get back——" as he held out to the startled gaze of Kirschner, an object which he had brought from the seat of the machine—a cloak cut strangely from a cloth of peculiar texture and shade of color, such a thing as no earth girl wore, in 1937 A. D.



The Solar System



PART TWO

*A scientific study
of the planets*

by John W.
Campbell, Jr.

TWO SCALES

HALFWAY between the orbit of Mars and that of Jupiter there revolve several thousand bits of matter in regular orbits about the Sun. The whole collection is grouped

under the name asteroids. Several of them attain diameters of hundreds of miles, but they are so small, their gravity so weak, their mass so infinitesimal that they are not considered worthy of

the title planet, but are called planetoids.

Jupiter, diameter 86,728 miles, mass 316.9 times Earth's. Saturn, diameter 72,430 miles, mass 94.92 times Earth's. What the planetoid Ceres is to Earth, Earth is to Jupiter. Would then, an inhabitant of 86,728-mile Jupiter call Earth a planet? Or would he call it, perhaps, a planetoid?

The entire solar system seems to have been laid out by two different plans, on two different scales, as though God had decided it were fitting and proper that there be a planetary system about this Sun, a Sun of a little better than medium rating, and had, forthwith started to make one. A dab of matter three thousand miles through, forty millions of miles from the Sun, was Mercury. A larger dab some eight thousand miles through and sixty-seven millions of miles from the Sun for Venus. Another eight-thousand-mile dab, ninety millions out, for Earth, and a four-thousand-mile pebble a hundred and fifty million out for Mars.

Then He started to make another, three hundred millions out, looked at the size of His creation and shattered it in disgust.

Perhaps He decided that while He was building He'd do a job of it. He started with a will, and with space to work in. He got clear away from that puny, little dust-speck system He'd started, went out a way where space was clear, twice again as far as his farthest, and started right: Jupiter, half a billion miles from the Sun, more than ten times the diameter of Earth, largest of the minor planets, over three hundred times as massive, a hundred times as massive as all four minor planets together!

Saturn, a real planet, nearly a billion miles from the Sun; then Uranus, a billion and three quarters, Neptune, two and three quarter billions of miles out in the void. Perhaps Pluto was an

afterthought, a thing halfway between the size of Mars and Earth, three and a half billions of miles from the Sun, what He scrubbed off His hands when He finished making the planets.

A fanciful account, but throughout the solar system there seems to be two distinct scales in use; the Minor Scale, with planets thousands of miles through, and tens of millions of miles from the Sun; and the Major Scale, with planets tens of thousands of miles in diameter, hundreds of millions of miles from the Sun.

Roughly tabulated:

Planet	Distance in Tens of Millions	Diameter in Thousands	Masses (Earth=1)
Mercury ...	4	3	.04
Venus	7	8	.81
Earth	10	8	1.00
Mars	14	4	.38

	Distance in Hundreds of Millions	Diameter in Tens of Thousands	
Jupiter	5	8	316.94
Saturn	9	7	94.92
Uranus	18	3	14.58
Neptune ...	28	3	16.93

In the distances, the Major Planets are more hundreds of millions of miles out than the Minors are tens of millions—Neptune being almost exactly twice as many hundreds of millions distant as Mars is tens of millions. If it were not for this, the Minor Planets would look almost like a model of the Major Planets done on a one-tenth normal scale, except for the masses which are even more disproportionate. Jupiter would make three hundred-odd Earths; Uranus would make three hundred-odd Mercurys; Saturn a hundred Venuses; Neptune fifty Mars. An inhabitant of Jupiter could say with truth, "We wouldn't call Mercury a first-class moon; we already have two larger than that."

A CURIOUS THING about the Major Planets is their low density.

For Jupiter being ten times and more the diameter of Earth has more than one hundred times the area, and more than one thousand times the volume. But it hasn't the thousand-times mass, because the density is 1.33 times that of water, while Earth's is 5.52 on the same scale.

That's another problem, too. Saturn has only .73 density, Uranus and Neptune about the same as Jupiter—1.36 and 1.30 respectively. Don't say glibly, "Deep gaseous atmosphere," because it won't work out that way.

Suppose there were a hole drilled into the Earth sixty miles deep. If you climb up a mountain three and one half miles tall, the atmosphere is half as dense at the top as at the bottom. Seven miles up it is one fourth as dense. If it increases at that rate going downward—it won't quite, but as a matter of fact there are factors which make it increase more rapidly—then three and one half miles down it is twice as dense, seven miles down four times as dense, ten and one half eight times.

The result will be that at the bottom of that sixty-mile hole you'd have to anchor platinum down to keep it there. In that air, so compressed, it would float! Water would float at about fifty miles, iron a few miles farther down.

But all those Major Planets have similar general characteristics; they are immense—ten times the size of the Minors, ten times as far out—for some reason they are not dense; they generally have a large family of satellites.

Another general characteristic of the Majors is their rapid rotation. The day of Jupiter is 9.9 hours; Saturn is 10.2; Uranus 10.7—not certain because of observational difficulties. Uranus isn't handy by. Neptune also is uncertain for much the same reason. Neptune about 15 hours.

In contrast, the Minors are distant tens of millions of miles, are thousands

of miles in diameter, and rotate in periods comparable to Earth's day—Mars in almost exactly the time Earth rotates, 24.60 hours.

It has been suggested that this is due to an original high rotational speed of all the planets, and just as Earth's rotation slows down one second in 100,000 years now, so the others have slowed down more or less depending on their masses and on the various influences acting on them.

Jupiter, because of its immense mass, requires an immense braking action. Nine satellites dragging on him haven't slowed him appreciably yet.

Mercury, on the other hand, has slowed down all it can for its year and its day are equal—88 days. The terrific gravitational field of the near-by Sun dragged on it till Mercury turns no more with respect to the Sun, facing it always with the same side.

Venus is so cloud-wrapped we know nothing about its rotation. Earth is comparatively massive, far enough from the Sun so that it is not greatly influenced by its tidal action, but seriously affected by the moon.

THERE IS another immensely interesting thing about this rotation, a thing which has led to speculation since it was first discovered. First, the Earth turns on its axis, the equatorial plane being tipped somewhat (23°) to the plane of the orbit in which it revolves about the Sun. The Sun rotates in the same direction also, turning on its axis in about 28 days. (This isn't accurate, for while the Sun's equator turns once in 25 days, the polar regions rotate once in 34 days).

The plane of the Earth's orbit is called the plane of the ecliptic and taken as an arbitrary and handy reference plane. Really as arbitrary as the meridian of Greenwich, since it was chosen for much the same sort of reason. We happen to live here. But

taken as a reference plane, the axis of the Sun's rotation is such that the equator is inclined to it at a very slight angle—about 7° .

There is no evident reason why Earth should not turn—the other way, why it should not rotate with the axis in the plane of the ecliptic, instead of the equator. Further, no apparent reason why the Sun should rotate in almost the same plane. But it stops any period of coincidence when we realize that every planet, planetoid, and nearly every satellite rotates and revolves similarly. Some definite, unknown force started everything in the system in the same direction in the same plane. A three-dimensional map could be drawn to scale on a sheet of paper, it is so flat. Pluto is the worst of all the slight departures from that single plane, being 17° out, with Mercury next, 7° out. All the others are within three degrees of the plane, Uranus less than 50 minutes out.

It was suggested that the asteroids, lying in the plane between the orbits of Mars and Jupiter—thousands and tens of thousands of jagged, broken pieces of rock and metal would cause trouble if ever interplanetary travel were attempted. Their countless incalculable orbits would make them cosmic buckshot aimed at speeds of miles a second at any body venturing near them. But even they obey this general rule apparently, and by going only a few degrees out of the plane of the ecliptic, they would lie in the great disk of the solar system below.

All but the two inner planets have satellites—nine for Jupiter, nine for Saturn, four for Uranus, one for Neptune, two for Mars, and Earth has its Moon. We know so little about Pluto we cannot say more than that we haven't seen one yet; but we have scarcely seen Pluto yet. Neptune, we are sure, has more, probably Uranus has, and Saturn and Jupiter may have

more so small they have not been detected. Quite a sizeable satellite could be missed if it were circling Neptune, two and a half billion miles away from the only source of light that could make it visible, and practically the same distance from us.

At Jupiter's distance we can detect one fifteen miles in diameter. But Mercury and Venus have none, because, it is suggested, if they ever had any, the Sun's titanic gravitational field pulled them away in ages past.

So incredibly immense is that field that it is the controlling force in some two light years of space, about 12,000,000,000,000 miles in every direction. And this is not a vain rule over utterly empty, matterless space. Out almost to the limits of that control go meteors and comets in immense orbits, looping in any and all directions. The plane of the ecliptic does not contain them; they spread in every plane—the wanderers of the solar system. Returning at long intervals for a brief visit before plunging again into space, these comets exhibit every conceivable type of motion compatible with the law of gravitation.

And comets come to grief. Perhaps they retire into the depths of space for two, three, or even four million years, 5,000,000,000,000 miles from the Sun. Out there, moving at velocities so low—astronomically speaking, but still of the order of 1,000 miles an hour—they barely crawl through space, and the pulls and cross pulls of the stars have time to act on them.

If it happens to have retired in the direction of a near-by star, such as Alpha Centauri, one may be pulled out of its orbit sufficiently to change from a closed elliptical orbit, to an open parabola that leads it out and onward forever, never to return. Perhaps in the ages that pass they come back at the wrong moment and pass close to Jupiter, or one of the other Major Planets.

Jupiter's own gravitational field is

titanic, so immense that fifteen million miles from him he holds a satellite in a grip the Sun cannot break. If a comet passes close to this giant, its orbit is badly wrenched, Jupiter may "capture" it, not as a satellite but in an orbit so broken, so small, that thenceforth the comet can never retire into space, and comets don't last long near the Sun. Their structure is too tenuous to stand the buffeting strains of the immense cross pulls of the planets.

If we could see gravitational lines of force, the solar system would appear a network of titanic springs, stretching and yielding but always holding, gravitational arms reaching from every planet to every planet, dragging and pulling at it, stiffening the whole system into a locked, firm system. Comets, collections of meteorlike material floating in space, held together by loose bonds of infinitely weak mutual gravitation, cannot endure such strains. Within a generation or two the captured comet is apt to disappear.

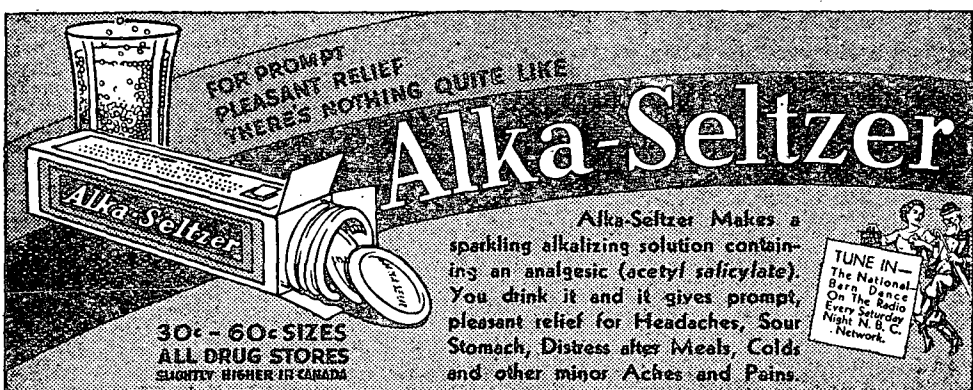
METEORS never fall to Earth from space. They fall to the Sun, and the Earth happens to get in the way. Countless billions of minute meteors strike the Sun, but they have no effect on it for all their numbers. Bright as meteors are, Lindemann and Dobson be-

lieve that 10,000 first-magnitude meteors could be held in one hand! Yet each one of them in its brief flight gives up energy at the rate 100,000 ordinary incandescent lights would.

It has been suggested that the merest push would topple the delicate balance of the planets; that if one were destroyed the others would crash to oblivion, because of the disruption of their fine balance. The "delicate push" would go precisely as far toward upsetting the planetary balance as throwing a cigarette stub off the *Normandie* would toward upsetting her balance.

The gravitational attraction between the Earth and the Sun has been compared to a steel cable of equal strength. The steel would have to be some thousands of miles thick. Any structure laced together with thousand-mile thick steel cables takes considerable pushing to reach unbalance. Further, if some inconceivable force pushed one of the planets a million miles Sunward, releasing that force would be an instant signal for the planet to spring back. If you depress one side of a balanced scale, releasing it permits it to regain equilibrium, naturally. If you completely destroyed the Earth, it would stop perturbing, or bothering, the other planets. And that is just about all it would mean—to the other planets.

To be Continued.



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Frictional Losses

*A Powerful Science Novelette
in which man reconquers his world*

by Don A. Stuart

BUT why, Hugh, do you insist on exploring always in these worst of the ruins for what you want?" asked Ban wearily. "These sharp-edged glass fragments, and the thick ashes—surely there are other parts of this junk heap that would satisfy you. I can see little difference, save that some parts are churned more than others, and this is one of the worst places."

Hugh Thompson shook his heavy, gray head slowly and straightened his aching back very slowly; for he was getting old now, and the living conditions he endured were very hard for him. His back felt fragile, breakable. "No, Tom. You are only thirty-two; you do not remember. New York was divided into many districts. Perhaps you can remember that they used to dig here for the food supplies? That was because this was a food-market district, too. But right in this section once was a great number of stores devoted to radio and electrical equipment. It is not as badly churned as you think. And here is our best hope, though faint enough it is."

Ban Norman looked about doubtfully. Great mounds and heaps of semifused and disintegrated rock and metal sprawled as far as the eye could reach in one direction, to the river's edge in the other. Here and there a crumbling remnant of a tower remained, balanced by an occasional hundred-foot pock mark that, walled with glassy, fused granite, was floored now with a thin layer of muddy water and scum. The

white masses of cracked stone were streaked with dark red, like the dried blood of the buildings they had been, from the slowly melting iron skeletons.

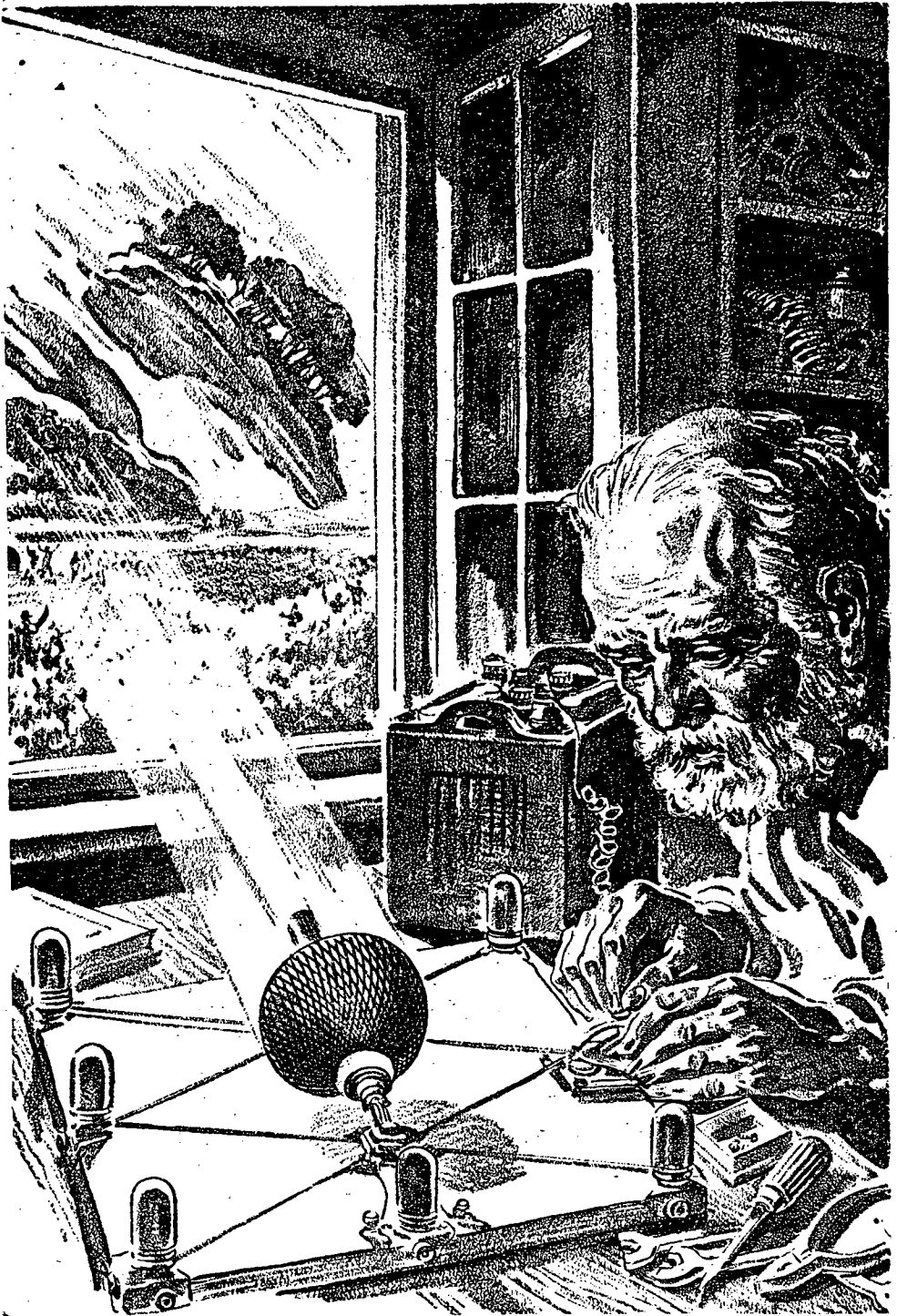
"The Granthee treated this section to an exceptionally heavy lashing. Why expect anything so delicate as the radio tubes you seek to survive?"

"Because we can do nothing else, Ban," said the old man, patiently. "I was no older than you are when this happened, and I first attempted to do what we have done for these thirty years now. Our little station has failed again, and all the people that have so faithfully sought to keep this thin thread of civilization are wondering again if the final break in the thread has come for us. Boston is gone now, has been for three months. Cincinnati is lost, we know, because Randolph Balling could get no man or woman to learn from him before he died.

"We are losing, Ban, and I hate it so. Man tried so hard, for so long—and, now, in three decades—oh, it is so wrong to give up hope."

Ban sighed, and moved toward the shade of some great, tumbled blocks. "Let us eat, while we rest and talk. What was this building?"

Hugh looked about him, at the great blocks, thrown down in a moment of petulance like a scattered child's toy. He tried to determine his location by the rotting remains of the docks, the tumbled heaps behind, the Jersey shore across the river. Slowly he shook his head. "It is thirty years, Ban," he said,



*He watched his set—and it worked—so he did not
look through the window—*

seating himself gingerly, and pulling the hard, blackish bread from the bag of woven reeds he carried. "I am forgetting how old New York looked. It has been so long I have seen it thus, it seems it was never otherwise. But there were few high buildings here, and this was evidently a very large one. It may have been the New York Telephone Co. building."

Ban looked about the ruins and shrugged. "I see no cables, or wires."

"No. But this was an executive building, and the central offices represented little of the equipment. It would be lost in this jumble. Besides, when the clans formed, they stripped every fragment of copper they could find from every building, to make pans. They could work copper more readily than any other metal, and all exposed cables were taken. There was lead, too, for the sling shots. We are fortunate, really, so much of the radio equipment was deeply buried for that would have been destroyed in those first years."

"But the buried equipment was ruined so that was no gain."

"It was not all ruined. And we can be thankful that much of the equipment had been refined to a ruggedness that resisted the strains. The metal tubes, for instance. They were but a few years old when the Granthee came. Had the old glass tubes been all we had, it would have been few, indeed, we could have salvaged."

BAN looked about sourly. "I can believe that. What was it that destroyed this section so thoroughly?"

"The atomic bombs. Some few of our own. That great crater I have shown you in the old park was one of our own, set off when the Granthee ship landed there. You cannot find even a fragment of that ship; even the metal of which it was made was ruined in that flare. The atomic bombs flared rather than exploded."

"If we had the atomic power they had, why was it that they, with their little force of a hundred ships came so near to conquering the whole world of man?"

"We did not have atomic power. We developed, toward the end, atomic explosives, which are very different. Grant Hubert has shown you explosives, and you know how different they are from fuels. We had explosives, but before we could learn to use atomic fuels, it was too late. The men and the laboratories and the machine shops were, it seems, gone."

"The Granthee ships appeared in April, over Russia, Chicago, Brazil and Central Africa. In July the thing was a thing done. They attacked, with their fever ray—an intense radio beam—that heated men like an intense fever, till they died in seconds. They wiped out life in Africa in a few days, and they wiped out all life in Asia, nearly a billion humans, within two weeks. Japan was armed as a modern nation, and withstood the attack for a week, and destroyed seven of the Granthee ships. She might have done more, but for the Japan Deep."

"The Japan Deep——"

"Yes. Japan was an island empire, of men somewhat similar to John Lun, yellowish, small men. But they had learned the ways of the whites, and fought more stubbornly, more heroically, really, than any others. They were a fatalistic race. They conceived the idea, and used it first, of the torpedo ships. I have shown you the wrecked airplane near Newark. They had many, smaller, but far swifter—little planes that could make three hundred miles an hour."

"They took those, and put heavy metal around the engine, and many, many pounds of explosive in them, and they filled the fuel tank with a substance known as picric acid in the gasoline. Their engines could not withstand that treatment for more than ten minutes,

but for those minutes they were terribly powerful.

"So those planes took off from the ground, and flew like great birds into the air, at a speed that would cover the distance from here to the clan in the Orange Mountains in less than three minutes—four hundred miles an hour.

"THE GRANTHEE SHIPS were fast, but they were very, very large, nearly a thousand feet long. They turned their radio beams on the planes, and the engines sometimes stopped, and sometimes didn't, and the pilots always died, but not before they had lined the ship on its destination. So, several hundred ships that flew thus—great three-ton explosive shells moving as fast as the bullet of that short gun I showed you, the automatic—one might strike and penetrate and destroy the Granthee ship.

"Not all the Granthee would die then, but, of course, on the ground, without their ships, they were helpless against the many men and women, despite their poison fangs. They could run very swiftly on their six legs, but it is impossible to run far, or swiftly, when you are enveloped in men who do not in the least mind dying, if only you die, too.

"And, of course, there were guns. The Japanese had some ships, they were called battleships, made of steel, very thick and very tough, so thick and strong that the radio beam could not penetrate, so big that any beam the Granthee could throw would not seriously heat them.

"These ships carried guns, not like the automatic I showed you, but tubes two feet thick, and fifty feet long, and their shells weighed tons. Those great shells, when they succeeded in hitting a Granthee ship, caused serious damage, and sometimes brought one down. The Japanese brought down two of the seven they destroyed in this way, and, as they landed, peasants with scythes and sticks and stones attacked them.

"The Japanese were a peculiar race, but they fought as all men fought in that day, with far inferior weapons—but enormous reserves. In the taking of one ship, with its load of a thousand Granthee, which fell near Tokyo, one of their great cities, approximately one million of the Japanese died. That is what was meant by the thousand-to-one ratio. Of course, not all that million ever got a chance to attack the ship, or tried to, but that number died in Tokyo because of the Granthee ship. Perhaps seven thousand actually took part in the attack.

"But had it gone thus, it would not have been too terrible for man's civilization, because there were only one hundred thousand of the Granthee. Had we lost only one thousand for each of the Granthee we destroyed, it would have been scarcely a serious loss. One hundred millions of humanity—and in that day we had two thousand millions. But the ratio was fifteen thousand to one."

"And even that would be endurable, were it not that, sooner or later, the second Granthee expedition will come and destroy the rest of us."

"Man fought on capital then. For a thousand years the world had been building, and for a hundred thousand man had been spreading. In three months he spent all he owned, in defeating the invasion. Japan lost everything because the vast atomic bombs of the Granthee loosened the islands, and they slipped into the Japan Deep, a hole in the ocean floor where water went down, down, for five miles, a deep that could swallow the greatest mountain of Earth, and remain unfilled.

"And Japan was gone.

"But the Granthee had flown west, too. They attacked Europe, which was a very densely settled region of high culture and civilization. But the Eurasian Granthee fleet had concentrated on Japan, and the even more populous China.

"In China, one Granthee ship fell, and six hundred million men died. India brought down two ships, because of the British defenses there, and Australia, we know, must have brought down eight, though there never was any message heard. But Australia had few cities, and vast country, so it may be that thousands roam about, unable to communicate with us. The thread of radio is so thin, so fragile.

"EUROPE fought and destroyed the Granthee ships, all that had come over her, and her cities vanished in the purple-red atomic flares and her people died in the fever beams. But there were many, many forts, and armored vehicles and battleships. These fought, and the fever beams could not reach the men, and the atomic bombs could not be dropped, since even to the Granthee ships, a sixteen-inch armor-piercing projectile loaded with half a ton of high explosive was no futile pebble. The Granthee shot their bombs as shells, but they could not hit the small fleet tanks, and even their might could not beat to the forts buried hundreds of feet beneath rock and soil.

"Oh, they killed the men gradually, because they turned the whole region of the forts into a lava pool, bubbling thickly like a great pot of candy cooking, so the men died. But the ships died, too. The battleships resisted them, one, even two bombs sometimes, and they were mobile and hard to hit, and even the Granthee could not boil an ocean. They hid the warships in clouds of smoke so they could not be seen, while airplanes that flew like darting midges against the sun told them where the Granthee hovered.

"So, finally, was the last Granthee ship over Europe destroyed. And nearly five million people still lived to rejoice. They started quickly though to work, the munitions factories starting again, the hidden, buried plants.

"The Granthee fleet over Africa came, and joined with what was left of the fleet that had destroyed Australia.

"Europe fought again. They had vast reserves in that day, because a war was forever hanging over their heads, and their armies were trained and their guns were made; and their piles of ammunition.

"They did as the Japanese did. Their men died in destroying Granthee ships with their little planes—and some new ones, rockets they called them. They were hollow metal shells packed with explosive—save for the guiding man and the fuel that drove them on wings of flame instead of metal. The Granthee could not avoid them, for even swifter and more mobile than the interstellar cruisers were these tiny things. Frequently they moved so swiftly the screaming metal shell did not explode till it was half through the Granthee ship.

"There were not so many men, then, nor women. The Granthee ships brought down were not always totally destroyed. Some Granthee lived to fight on Earth, and because even on the ground they were deadly, trained troops advanced cautiously and destroyed them carefully. No Granthee lived long, you understand.

"And, finally, as you know, the last Granthee ships landed, only three still in navigable condition. But they landed in England, which was an island off the coast of Europe. They had battered its every weapon of destruction. Now they set out to capture its humans, and did, for there were very few and no weapons whatever. The last three ships were destroyed by humans who let themselves be captured, together with packs of high explosives, or poisonous gas bombs.

"And in America here, the cities had all been battered as have these humbled blocks. There were no more cities, nor any government, but men needed no government to fight now. The first

AST-3

fleet that reached the United States we destroyed, as they had destroyed the fleet in Europe. More came from South America.

"This country is very large, so large you cannot understand. There is so much land the Granthee could not cover it all with their few ships, and everywhere there were humans who hated them. A man in New York discovered one way to release the energy of the atoms, and he made a great many bombs that would do what the Granthee bombs would do. He couldn't shoot them in guns, and they required a great deal of apparatus to set them off. But four Granthee ships were destroyed by them when enslaved humans carrying food to the Granthee, carried those bombs instead.

"IN THREE MONTHS the Granthee were all destroyed, the last few who were captured were tortured horribly. The few scientists among us who still lived, after the destruction of the laboratories where they had been working, tried to question the Granthee, but the people hated them too much. They heard only the defiance that the Granthee screamed at men—that the second expedition would follow.

"Man had fought, and defeated the first expedition because though his weapons were far less powerful, he had so many of them, so much material, such immense odds in his favor so far as man power went. And such colossal hatred that suicide was nothing to him. Willingly a thousand, two thousand humans would die if only they could take a single Granthee with them.

"It actually averaged about fifteen thousand humans for each Granthee, and still all the Granthee died, and there were humans left."

"But there are only about two million humans in all the world now," said Ban. "The second expedition will find that the first has done its work. Mankind is

reduced to an easily conquered remnant. So what have we gained?"

Old Hugh shook his head. "That is not the philosophy of mankind in the past. Not what have we gained—but what can we do to that second expedition to defeat them."

"Yes," said Ban bitterly, "but you accent it wrongly. What can *we* do to the second expedition?"

"The scientists who survived have been working steadily. They have the secret of the Granthee radio fever beam, and they have atomic bombs, if they can only get a suitable source of power."

"If!" said Ban. "If—and we use an old Diesel automobile engine and a converted electric motor for our source of power. We burn weird fuels like the wood gas we used last spring, and we chortle our triumph of getting a staggering, weak signal into the air.

"There are no repair shops, no tools, no machines. There is nothing. We are still living on the capital mankind built up before the Granthee. We paw now in the ruins for strayed bits of that capital, helpless without the stored labor of men long dead. Only the things those dead hands reach out to give us give us this false flicker of civilization, a dying candle flame that splutters up once in extinction. We live because life is an automatic process. We have children because that is an automatic process we cannot halt. We grow food because we suffer hunger if we do not, and we fear the face of Death.

"It is false to delude ourselves we accomplish anything. What good is that triumph of the mind—that we can imitate the fever beam of the Granthee? Stolen idea from dead Granthee, made from stolen apparatus from dead cities. And even so the fever beam is useless when the enemy is behind a metal wall, and when does a Granthee come out to fight? What have we?

"Why grub in fallen ruins to communicate to people in no better state



"Oh, they killed the men gradually, but the ships died, too!"

FRICITIONAL LOSSES



"Europe fought—and destroyed the Granthee ships."

than yourself? Why try to build anything that the Granthee may tear it down? Men built a city here, a great city of steel and stone and beauty. They were far greater than we, they had a skill that is dead with them, a power that is vanished, too. And with all their weapons, with all their vast capital to expend—they are dead. We have not the skill, nor the capital nor the weapons. And the second expedition comes; they have told us that much.

"You old men who saw that civilization cannot forget it. You go on dreaming your dreams of rebuilding it. But we who have grown up since have no false hopes. We never saw it, and we know we never will.

"Man's capital is spent, his income is spent, he is pawning his last proud possessions. Man's civilization is done. He may still have pride enough and power enough in his shrunken body to destroy himself before the Granthee come to capture him. Man is the only large animal remaining on all Earth, and the Granthee must capture him. Then you know what his fate will be. Man will be the horse to labor, and his child the chicken to eat. And it is sure for many live now who have not the wit to see it, nor the will to escape it."

OLD HUGH SIGHED. "I know, Ban, I know," he said softly. "I have felt it, and feared it, and understood that. And for two reasons I go on living and working: The first is that there are those who have not the wit nor the will, and for the sake of those who would become the horse and the chicken, we must try. There is a third reason, too, so I will say that my second is that the Granthee did not know when the second expedition would come. It was only a promise when they started—an empty promise.

"The greatest reason is that other men go on working still, with man's old

courage and his old skill. You know that in Schenectady there are men who are not stealing apparatus from dead cities, but making new. And in Detroit they are making engines again—engines that burn wood and do not wear swiftly nor easily, with bearings that are lubricated as we are lubricating ours, with oil pressed from castor oil beans we can grow here."

"Do they make guns that can blow apart Granthee ships? Do they make swift rocket ships to drive a trail of destruction through——"

"Not yet, I know, Ban, but——"

"But the second expedition will put a stop to that. Old Hugh, I love you, love you as the only father I've known; but you struggle against impossibilities. The castor beans you mentioned—— You know we will have oil but a little longer, since the frost destroyed last year's crop. Then our paltry little machines will slide and grate to a stop, as frictional losses destroy their efficiency and their metal. Friction has stopped man always."

"Not friction, but inertia has stopped mankind, Ban."

"Aye, the momentum dies, and the race glides to a halt as friction slows it. But come, old Hugh, I will help you, for I know the work is dear to you. What you are attempting now I do not understand, but I know you want more tubes, more apparatus, so we will grub among the ruins, you and I."

Ban rose slowly, and picked his way over the tumbled stones and rotting wooden beams, charred and blackened by fires the atomic bombs had started and angered Nature drowned in ton on countless ton of outraged rain.

Wearily the old man picked his way along, head bent, sorrowful. He knew the truth of what Ban said. But Hugh was of a generation that had known and yielded to hope. His generation would always yield to it.

II.

THE SUN was sinking into long summer twilight as they made their way down to the rotting dock. They were heavy laden and old Hugh was happy, picking his way along among the tumbled blocks. Cautiously they lowered themselves to the little rowboat, looking anxiously at the sullen flow of the river, a clean, clear river now, with sunken rusty hulls visible beneath its surface.

The tide was turning soon, and the water moved slowly, gurgling very softly round the piles of the pier. Gulls swung lazily on the little choppy waves, watching the men with keen, bright eyes. Men were a source of danger to gulls; to men gulls were a source of food—a rather strong-flavored soup, but nourishing.

"Lower them gently, Ban," said Hugh. "I'm afraid we'll have to go farther afield next time. The instruments, thank Heaven, were in working order. Here's the receiver—and that other one. It's heavy, so be careful. Look, here's something we can use that I found just as we left."

"What is it? It looks like a small motor or generator, but has no power shaft to take hold of."

"It is both, a rotary converter. They used to use these on automobiles to run radio sets, it has a 6-volt motor and a 110-volt alternator wound on one armature, so that it produces 110 A. C. from 6 volts D. C. We have lots of powerful storage batteries from old automobiles, and this is a 500-watt converter, so we have something very useful."

"Hm-m-m—it may be. I've never seen one before. Well, are we ready?"

"I'm afraid that's all. I wish I'd been able to find that roll of copper tubing the old invoice listed. He must have sold it——"

Silently they rowed across the water as the long twilight settled. Stars came out, and the moon, as they plodded

along, the little child's wagon behind them. They went over the rough cobblestones of the old Meadows road till they passed the torn section, then on their bicycles to the Orange Mountains.

The moon was high when they reached the lighted buildings of the clan. Ban's wife greeted them, slightly curious, as they returned. The neighbors came in, a few at a time, to look incuriously at the treasures Hugh had collected, and to ask news of the road, for few and seldom were the trips so far from the clan. They slouched out presently, only old George staying to help them, an automobile mechanic once, venting his love of machinery on their decrepit old engine.

"They were calling you to-day, Hugh," he said. "I couldn't do anything, and they couldn't seem to make it with the telephone thing." He shook his head sadly. "I never could understand those buzzes and clicks. I wish they'd talk language."

"They can't always, George. Code will get through with less power, and we all have so little power. I'll send out a call and see if I can find who called me."

The little Diesel pounded presently, with gnarled old George soothing its heavy knocks as best he could, and the transmitter, patched and jury-rigged, began to operate. But no answer came to their call from the silent ether—only the soft wash of static. Hugh shook his head and shut it off. "No response, George. They'll call again. They always do. They always have time. I'm going to start working on that fever beam, I think."

"Fever beam," Ban said. "You might give a mouse a dangerous fever and——"

"No, you don't understand. Fevers can cure, too. I'm going to build a curative fever apparatus, one with power enough to heal, though it cannot hurt. And that metal tube you asked about is no weakling Ban. It will handle five

hundred watts, and we have six. If they are all in operable condition, as I believe they are, that is not insignificant power. It is more than we have had before, for a long time." Hugh gently reproved him.

Ban snorted again. "More than we have had for a long time—and enough to cure, but not harm anything, even a large mouse!"

"But I will learn, I will learn how to construct the beam. And you will learn. That is important, Ban; we must remember that. So help me now, while I test these tubes. Remember that they use four thousand volts, and be careful please."

IN TWO DAYS they had finished the things, and set up makeshift apparatus. There had been a thyratron tube there, too, a thing that old Hugh brought along out of interest, and a collector's acquisitiveness, for it was not a radio tube, capable of control, simply a type of switch capable of operating at near radio frequency in effect.

It was set up on a panel of well-dried, seasoned hardwood, for there was no more bakelite or hard rubber to be used, and slate was hard to get. And the wires were never insulated, merely spaced, because insulation had rotted and fallen off in the years since wire was made.

But they tried it, and it worked to some extent. Not as well as old Hugh had hoped, but nothing ever did, for his apparatus could never be quite the right apparatus, but the nearest equivalent to hand. By radio he held long conferences with those men in Schenectady who had not forgotten their craft, and developed ways and means to measure what he had no instrument for measuring—wave lengths and frequencies, wave forms even, after great difficulty, from an old television tube that had somehow maintained its vacuum. Television they could have no more, for television re-

quired waves so short they could be sent only with horizon distances. But the old cathode-ray television tube became an oscillograph.

Old Hugh looked at the result in dismay. "Ban, I'm afraid our apparatus is very faulty. That's not a sine wave, but a wave form for which man has never invented a name. Well, it can't be helped. We must do what we can with what we have. The men in Schenectady have sent one of their young clansmen on foot and in canoe clear out to Detroit to help the men there.

"Presently, radio equipment will be made there, too, where they have production machinery still—and again, and vast cargoes of raw materials. Maybe then we will get new and good equipment, tubes that always have their vacuum, and haven't gone 'soft.' They will make caterpillar tractors that burn wood gases, and use castor-oil beans for lubricant. Then they can break through, and start commerce again. They are going to make big boats again, and try to ship things on the Great Lakes, and finally, even, a huge Diesel of hundreds of horse power to the men in Schenectady."

"Huge!" said Ban. "Hundreds of horse power! The locomotive those men at Schenectady once made stalled outside of Montclair, and it used fifty thousand horse power, a mere fraction of the load of one substation!"

"It is huge," old Hugh maintained, hurt somewhat by the tone of Ban's voice. "We are rebuilding with a very little start. We have a great task, and that will be a huge accomplishment, Ban. Men will try very hard for that, and work with a great love and pride and an honest effort that man never exceeded. It will represent the hopes and thoughts and labors of many men, an accomplishment they can be as proud of as any ever done.

"The giant machines are gone, and

man labors again with the sweat of his brow and the craft of his hand. That engine will release many hands and many brows to greater, better efforts. Did I not know it useless, I would urge you again to go to Schenectady, that you may get real training and do your part in this greater labor ahead."

"The labor ahead is useless. The second expedition is ahead."

"I KNOW, BAN; I know your answer. But come, I want to show you something of interest. You remember that neon bulb I brought? Take this terminal of the new power set in one hand, and the bulb in the other. So. I will turn it—no, do not loose your grip, hold tightly and remain on that insulating plate. Do not touch the ground, though that would probably harm you little, but stay there and hold the tube. So—and see."

"Eh—it lights!" Ban stared at the brilliantly glowing tube. "With but one connection—through my body. How can it be so? My body has very great resistance, you have schooled me, and for power to flow, always there must be two connections."

Old Hugh chuckled. "I shall show you something perhaps yet more remarkable. See, here is that coil I wound yesterday. I told you it was a furnace, and you looked at me askance. So. Now will you hold this metal cylinder, and I lead the wire here, to the coil, and again to the set here. You are in the circuit, see?"

"Aye, I'm in the circuit right enough, and I like it very little. Old Hugh, are you sure of yourself?" Ban asked dubiously.

"We shall see. Now, the furnace is set on this table, and in my hand I hold a bit of asbestos, hollowed to hold a few scraps of aluminum metal. Now—I turn on the power set, and thrust my hand in the furnace—"

"By the gods of time! It's melting! Your hand—"

"As cool as you please, my son." Quickly the old man shut off the set, and tossed aside the molten metal.

"The radio-frequency currents play strange tricks, for they run not through your body, but across it, like water. These extreme frequencies cannot go through any conductor, but always across its surface. It is called the skin effect. When it passes as a flow of current in a wire, or any conductor, it is only on the surface, yet when acting through an insulator, it acts all through it. In the furnace, it attacks the metal, but not my hand, for my hand is a very poor conductor, and a hard path, while the metal is a very good conductor, and an easy path.

"It is very interesting, but not useful I am afraid," he said. "Come, we must see what we can do to correct the fever-beam hook-up, to get better efficiency, and the correct wave form. I wonder if the wave form can have any peculiar effects—something unusual. I wonder perhaps—"

"What? What might it do?"

"I was thinking—thinking of the time I worked with a quartz-crystal oscillator, and built up the frequency till it exactly corresponded with the crystal's natural note and—the crystal was white dust. Maybe I could develop a wave form that would pulverize even hard steel that way—"

"Maybe. Then you could break all Joan's sewing needles, and maybe even get enough power to crack one of her knitting needles. There are many things you might do—if you had power.

"Old Hugh, I do not like to see you spend your time uselessly."

"I have nothing else to spend, Ban. Let me work. Who knows—but let me try, it costs little, and might be worth much."

"It costs a mouth to feed, and work to gather oil for the engine, and wear

on the engine and tubes. It does cost us time." Ban looked at the old man sorrowfully. "The others complain. I do not; I know what you are attempting. But it is they who must work to feed you, and, as yet, the communication they have maintained all these years has brought them little good. Twice only it has warned them of a killing frost, once of the great storm. Beyond that—since the bandits have all been destroyed, it has done them little good. They grow restless, Hugh."

Slowly Hugh looked away, out through the window toward the hard-working men in the fields, women weaving again on hand looms. It had been a fad once, in the world he had known, before the Granthee. It was no fad now; it was protection against the winter, and, because the wool was never cleaned completely free of its grease, against the rains.

"I know, Ban. I told Dr. Ponting I would call him at noon to-day. I must call."

"And I must go," said Ban. "I will be back this evening."

III.

OLD HUGH sat silent, fingering slowly the crude key of his transmitter, a bit of brass spring he had cut himself, mounted with a scrap of a platinum wedding ring above and below for contact points. The platinum wedding ring had been found on a slender, bleached bone protruding from beneath a great tumbled block of stone in the city. His lined old face grew more and more sorrowful: Finally he buried his face in his gnarled old hands, and his body rocked slowly.

"Three groups," he muttered, "three groups in all the world. So far as we know. Never have we roused Europe, never Australia. Three little groups against the vast inertia of two millions. The first expedition was destroyed, and

utterly defeated—yet it has won. Ah-h-h if only——"

Hours later he fussed with his apparatus, setting up the parabolic netting of wires he had contrived after Dr. Ponting's radioed directions that noon. He was working over it carefully to align exactly the bit of copper tubing a few inches long that was its aerial, designed to radiate these ultra-short waves. Multiplex ultra frequency they called it in Schenectady. It was ingenious, perhaps too much so for him, his wave form was so poor.

Carefully, because he had much time, and no real aim, he checked his work by the plans he had copied down from the messages over the radio. The triple generating oscillator set, the power set, the mixing oscillator, the phase indicators were all in order. But somehow they did not combine properly.

Then, quite by accident, he noticed that he had connected one of the tubes slightly more than 185 degrees out of phase, instead of slightly more than 5! And a screwed connection near it had come loose. No wonder his wave form was peculiar, his efficiency low: one tube fighting the other two!

Muttering to himself in vexation he brought a screw driver and tightened the connection down firmly, solidly. Then, just to test it really, he turned on the set. The oscillograph began to move as heaters warmed up, then abruptly struck a weirdly shaped wave, and broke again, abruptly, into the peculiar wave he had been getting just as there sounded in the quiet little room a very sharp ping.

Hugh looked curiously, and shut off his set hastily. The loose connection was not merely loose now. The screw had vanished!

Vaguely worried and surprised, old Hugh replaced it, and turned on the set. This time he watched that screw. The tubes were warmer now, heated more



Old Hugh's eyes were bleak and dark as he looked along the edge
and wondered what power he actually had—

quickly. *Ping!* Very sharp. And the screw was gone.

Old Hugh brought the soldering iron and soldered that connection in place, and wondered. Again the set started. There were five distinct *pings* this time—and a little tinny clatter of falling metal parts. The beautifully constructed little paraboloid director lay in disassembled parts on the table, quite scattered and crumpled—not harmed, merely taken neatly apart in a hundredth of a second, with a little stinging *ping* of metal.

A MAN trained in research through a lifetime would have stopped there, and worked very hard with his mind, and sought some explanation, some theory, then devised a theory-testing experiment to prove or disprove that theory. Old Hugh had not done research work, real research, for thirty years. He had simply tried to make delicate mechanisms work with defective apparatus. To him, this was simply more defective apparatus. With the patience a generation of troubles had taught him, he knelt down on the floor and hunted about the little shack till he had found five bolts, four nuts and two tiny screws.

These were precious things, these little screws, because they couldn't be made any more, and they were so hard to get—such little things—they sifted down among the *débris* to unattainable depths. One nut was missing and he had to replace it from his hoarded stock. Then, patiently, his stiffened fingers assembled again the little thing that had fallen apart, and bolted it firmly.

Then he started his apparatus again. But he made sure this time that the thing would not be so defective. He wired the tiny nuts in place. And now in all his circuit there were only soldered joints or bolts with nuts wired solidly in place. And he turned his projector where it would send its beam harmlessly

into the mountainside half a mile away, and so started the set.

He watched his set, and it worked, so he did not look through the window where, half a mile away, a mighty mass of rock and earth and giant trees began to move in a ghastly silence down the hill. For seconds the thing moved in majestic silence, a whole section of the hill gliding downward, swifter and more swiftly. Then it broke in flying, smoking rock, crashing and roaring in monstrous shock. The shouts of men, the screams of women made him rise suddenly and step hastily across the room, not even pausing to shut off his machine.

He fell with a sickening jar, heard the dull snap, felt the meteoring pain that shot up his leg to become a vast, unbearable ache. He tried to rise, and fell back whimpering softly, calling bewilderedly, mercifully numbed, as yet.

IT WAS HOURS before Ban found him there, in the dark little room, with only the faint glow of the heater tubes shining in the dark. The steady pounding of the Diesel had attracted him from the mystery there on the hillside that the men were looking at in awe and vague fear. They wanted old Hugh, suddenly wondering where he was, who might explain this to them.

Gently they lifted him up, unconscious now, and the old doctor showed them how to set the bone again, giving in words the skill his hands possessed to hands that had the strength his no longer held. Then they bound the leg, and straightened it, and beside him two women watched. They fed him when he woke, feverish, mumbling.

Ban shut off the experimental set, and started the transmitter. Through space his message leaped to other sets and found them deaf. This was not communication time.

Morning came, and again Ban tried, but now the men came in. The mystery

had vanished in the night. The rock slide was there, and the more distant, strangely truncated slope was visible beyond it, raw and harsh. But the strange thing had vanished.

Ban called again. Schenectady answered finally, and to them Ban poured out the message: Hugh Thompson feverish and sick with a broken leg; the mountains moving and stirring, strange rocks down which Jeff Hurley shot, slipping without resistance till he brought up a broken hull on a great boulder outside the area of damage, damaged himself beyond repair—dead; the broken mountains—

And no mention of the set. For the men of that later day, even when trained somewhat did not so rapidly connect cause and effect. And in every mind, anyway, lurked the thought: the second expedition.

Old Hugh woke late that afternoon, and they told him of the mystery, at his insistence carried him to the little room and his key. And from that position he saw the meaning of the thing.

"Ban," he said suddenly, quite softly, "Ban, look along the axis of the paraboloid there, and tell me——"

"Eh," said Ban, "the slippage is along that line. What do you suppose made that paraboloid line up with that damage? Some magnetism——"

Old Hugh groaned softly. "Oh, Ban, can you believe nothing you see, either? Move that paraboloid one degree further toward the mountain, making sure no man is in its path——"

"But no, there will be half a hundred out there now. Never mind. I must think why. But first—start the transmitter."

At the key he called, called vainly for a long time. Schenectady answered after a while, and rapidly he told them of his mistake in the connection, and the damage involved. They would try it, on a barren mountainside.

His description was too accurate. Old Hugh said "Right through the wall."

They did not hear from Schenectady that day, or the next, as old Hugh grew more feverish, became delirious. Ban caught the weak, broken signals the third day. "—building as—gested. Something—ent wrong, for the entire building—lapsed. Transmitter ruined, as—ell—set we—ade up. No power. Will—d more later. Greatest—covery—as ever made in hist——" And no more could he catch; so he put down what he got, and turned back to old Hugh, uncomprehending.

IV.

THIRTY YEARS of harsh, rugged life lay behind old Hugh. Somehow the fever abated, the pain lessened as his sturdy old body rallied in defense. Slowly, he began to recover, and still no message came through from Schenectady, though two weeks passed. The women who cared for him had cleaned the room, and Ban told old Hugh, negligently, that the message he'd been unable to clear up had been thrown out.

Old Hugh was busy thinking. But the problem eluded him. Somehow, he was sure, he had destroyed some of the rock crystals to powder as he had hoped, yet he could not understand; it was beyond his belief that so tiny a power, a bare three horse power, could do so much damage. Surely, it seemed, it would have taken vastly more. But, perhaps it was some really rare constituent of the rock, rare but vastly important that held the secret, some unconsidered crystal that was the key log in the jam that made rock solid, vibrating in chance tune to his set, and vibrated to powder.

He cursed that lost nut he knew must be guilty for his fall. A little rolling nut—but the feeling as he fell had been so strange——

He didn't see his ragged, raveled

clothes. When the women brought them back to him they had been carefully repaired, as all things must be where all things are worked for and made by the sweat of man's brow and the craft of his hand. Perhaps they would have given him some little hint.

But he itched to be at it again, determined now that, pointed to the skies, the thing must be safe. So he had the men bring in samples of every rock they could find at the great slide, and, when he could hobble again on his crutch with Ban's aid, he set the paraboloid on its back, and the rock specimens above it on wooden shelves, turning the power to a very low degree. Then he turned on the set that had not operated since he had fallen there by the window, and broken his leg as the mountain slid down.

Slowly the tubes warmed up. He watched with interest and care, the little stones on the little platform just under the low roof of the little wooden shack.

Then the tubes were warm, and there were a great many slight *pings* of sound, and a very quiet, swift slip of the roof and the sudden heavy thrashing as the roof fell in. It was fortunate that the device was so effective, for the roof came in as separate shingles and boards.

Old Hugh groaned as they dug him out, and reached a hand to feel the device that had done this. His leg hurt, his head ached abominably, his laboratory was a ruin, evidently, but he was not seriously hurt, nor was Ban. Ban's wife was crying and dabbing at his bleeding face, questioning frantically and tongue-lashing old Hugh simultaneously. She was pale, and very scared, for the shack looked as though a monstrous giant had stepped heedlessly on it.

Ban stared dazedly and bewilderedly at the wrecked laboratory. "I know," he said suddenly, looking owlishly at old Hugh. "What they said was 'building collapsed.' That was it."

Old Hugh laughed shakily. "A fine time to remember it, my boy. We can confirm their report."

"And they said it was the greatest discovery in history. I'll bet that was it. Yes. I know it was. You've got the disintegration ray, Hugh!"

Old Hugh shook his head. "It doesn't fit, Ban. It does the job, but I don't know why, nor how. That's never really safe. We must find out why."

"Why? We can work it."

"Eh? How well? How much?—I'm going back in there."

SILENTLY, other men began to clear the wreckage away, and with their efficient taciturn movements, more and more apparatus began to appear. Old Hugh interfered with them as he brought forth coils and condensers and little metal tubes, his soldering iron and the precious little alcohol soldering torch, a piece of dry, seasoned wood, a few condensers, the rotary converter. Miraculously, from the ruins, Ban brought the oscillograph.

With gnarled, skilled fingers old Hugh built up the thing on his bit of board, a foot square with one-inch tubes and a gently hammered piece of annealed copper in the form of a bowl. They brought him, silently, the things he asked for, and silently stood watching.

It formed under his fingers. At his command, Ban brought the storage battery they had built up from the sound parts of a dozen decrepit wrecks. Hugh attached his terminals, and the little converter whined. The tiny tubes grew warm and a wave form built up in the oscillograph.

"A good research student would know just what to do. I think I know just what happened now, Ban, and the way to test it is to see if my theory will predict results. I have aimed this at the horizon. Ban, will you catch that little kid over there, and place him on that bare patch?"

Ban tried, and with the aid of three other men the struggling kid was brought and placed on the bald knoll. "He won't stay, Hugh."

"Leave him and run at right angles to the beam, Ban. You others step away now." In a moment Ban ran—and old Hugh pressed his key. The running goat bleated suddenly, tumbled and slid along the ground, his feet threshing and struggling, bleating louder now, mortally terrified. For half a minute he struggled, flashing legs fly-

tear down the old wooden house there and haven't had the time to do it right and save the nails. Well—Ban, you pack the battery, will you?"

Hugh set off down the grassy lane that was all the main street the clan had. At the end of the row was the old, rotting house, deserted, broken, preserved only so long by the original sound construction, and the fact that men who grubbed for every grain of food they ate had no time yet to tear it down carefully and pull the nails out straight and

Don't Miss:

Next Month!

PROTEUS ISLAND

by

Stanley G. Weinbaum

ing without result—then he was up and bouncing away like a thrown rubber ball. In moments the kid was nibbling grass, tossing his head back toward them, bleating defiantly.

"Yes," said Hugh, eyes flashing, "I was right."

Open-mouthed, Ban stared at the little animal. The lean, silent men moved restlessly. "What did it, Hugh?" asked one at length. "That goat acted like he got on a cake of ice, and even then I never saw one of them sure-footed little beasts slip like that."

Old Hugh was disconnecting the battery. The rotary converter slowed from a whine to a drone, and stopped. He looked lovingly at the foot-square board and the copper bowl and the little black tubes, like dull metal acorns, less than an inch high. "Yes, that's what broke my leg that day. I know now. Old Jim Duncan, you've been wanting to

usable, keeping the boards, most of them, unbroken and sound.

THEY followed him silently. Talking was not a highly developed art among these people, not as it had been when old Hugh was young Hugh. Ban set down the battery at Hugh's gesture, and the old man laboriously set himself on the ground, his game leg sticking out before him. He connected the set, and the converter whined again. Old Hugh lined the copper bowl on the tumble-down house and pressed the key. A thousand, thousand sharp *pings*, a sudden settling, a clamorous rattling of boards—the building was down, and dust swirled slowly.

"Great heaven!" gasped Ban. Suddenly he was running forward, toward the house and—through the beam. In an instant he was down, skittering along the ground, threshing arms and legs.

Quite unhurt, evidently, but surprised, and suddenly embarrassed.

Old Hugh cut off the key. Slowly, flushing, Ban rose to his feet, absolutely nude save for his leather belt, his leather shoes, a mass of thread and lint that reduced itself, as he moved, to individual hairs, all that remained of his clothes. A slow roll of laughter welled from the people. Then his wife was running forward, her face crimson, her eyes blazing wickedly at old Hugh as she glanced toward him in her swift passage.

"Wh-what happened?" asked the unhappy Ban Norman.

"I sort of think you better get dressed again, Ban, before you start gettin' queasy," said a laconic, faintly humorous voice. "Looks like you wore out them clothes in a hell of a hurry."

Ten minutes later Ban was back, his angry wife bristling at his side. A soft murmur of chuckles ran through the folk as they straightened from their work of gathering nails and screws and useful bits of metal from the old house. Long, straight boards, mostly unharmed, were being stacked to one side.

Old Hugh looked at Ban with twinkling gray eyes. "Maybe my puttering will be some use, yet. See?"

On the ground before the humming little set a pile of lint was accumulating. The women were at work. Every old, worn-out bit of clothing in the clan had been brought and reduced to its original fibers in moments. "They can reweave them now, into new and useful material. And Ban, they are beginning to feel something else. Do you see all this little, little thing means?"

"I see something it means; you old fool!" snapped diminutive, peppery Joan Norman. "It means I have to weave Ban Norman a new suit! First you tear down the house about Ban's ears, then you tear the clothes off his very back. I had to make that, and those you're wearing too, you muddle-witted ingrate.

You have less sense than two-year-old Junior and don't use what you have! You and your messy batteries and coils and wires. Every day Ban comes home with holes in his things, and now—now you're not content with just making holes in them, you tear them all to pieces, right back to lint, and make a spectacle out of my Ban. And will you——"

GENTLY, Ban picked up his wife and carried her back to the house. Ten minutes more and he was back, grinning. "She's peeved. But Hugh, what in the name of the heavens have you got? I don't——"

"It's the skin effect, Ban. I've figured it out now. That's why so little power does so much, so very much. Look, it induces those extreme frequencies in any conductor, and almost anything is more or less of a conductor because of moisture in it, and those frequencies go, of course, to the surface. How they do it, I cannot guess. Yet, somehow, they rearrange the molecules that they become perfectly fluid, there just on the very surface, and absolutely destroy all friction."

"Friction! But——" Ban gasped, and fell silent for a second. "But I do not understand—friction——"

"Man has always thought of friction as his worst enemy, yet he cannot do without it. Look, your clothes fell apart in a moment, because the woven strands were held together by their friction. Even the knots were held by friction. The shed fell on us, as the house fell, because the friction that held the nails in was gone, and the nails, of course, sprang out. I was vastly tempted to turn it on the Diesel, and get along without oil, till I remembered—every bolt and nut would fly off as though a charge of explosive lay beneath it, for each bolt and each nut is held in place only by friction. In a hundredth of a second the Diesel would have be-

come a mass of disassembled, oil-splattered parts.

"They know it over there, I think. We have lost some of our fear now, Ban, because——"

"Then—then that little set—there could tear down a small mountain! It needs no power, the weight and force of the mountain would do it all!"

"This needs no power," said old Hugh, brushing about his head at the dull hum and buzz he took to be a fly.

Only the low cries of the men over by the fallen house made him look up. Some five miles away, two or three miles up, hung two great, blackened, pointed cylinders. They buzzed like vast, angry insects, and pale, lambent flame rippled and played about their atomic exhausts.

They seemed to move slowly, so far and so high there, as they drifted across country. Then one twisted and dipped, in its course. A thrilling wave of warmth seemed to reach down to them; the men by the house dropped their tools and the lumber they carried. They ran to their homes. Already women and children were coming out, joining their men and vanishing in the green depths of the wood.

Old Hugh's eyes were keen and bright as he looked up into Ban's dull, racked face. "Oh, Lord," said Ban, and turned suddenly toward the clan center, toward his home. His wife was coming out, crying for him, little Junior in her arms. Ban ran swiftly to them. The feeling of warmth and heat made him sluggish, he realized suddenly as he ran to them.

Old Hugh looked after him, and turned back, a lone little figure squatted awkwardly with his broken leg stretched out before him. From the wood came softly muffled cries. Only two words seemed to filter through—"second expedition."

Old Hugh stirred beside his softly humming little board; the old, patched battery; six little metal acorns, warm to

the touch; a little copper bowl. Old Hugh's eyes were bleak and dark as he looked along the edge of the board and wondered what power he actually had in his tiny, futilely whining bit of wood and metal and insulation.

An unbearable violet flame leaped suddenly in the skies, shrieking a thousand feet in the air. A rain of black metal separated from a solid clump to spread in a long, stretching line that reached down and down in masses to the waiting earth. It settled at the base of a giant rock, finally, as a second long rain of metal reached down and down.

Somehow, miraculously, living, moving parts separated themselves and stood a moment, bewildered by sudden helplessness, perhaps, pawing at the broken wreckage, glinting peculiarly like an iridescent metal in the afternoon sun. The old man hobbled to a higher knoll, dragging the heavy battery and the little bit of wood and metal and insulation.

The great cliff stirred, moved. The afternoon quiet echoed to the vast, angry mutter of the mountain. Annoyed, it seemed to settle more comfortably over the spot where, iridescently, purple things had moved.

V.

BAN looked in at the doorway of the wrecked shed cautiously. The Diesel was humming rhythmically, and the whine of the generator sounded sleepily on the quiet, late-afternoon air of the deserted little settlement. Old Hugh was propped up on three broken boards; his game leg tenderly rested on a fourth. On the bench beside him was the rough, dry board, and on the floor the old, decrepit storage battery. There were soft, quick hisses and buzzes coming from the loud-speaker on the table—a rather dented and battered loud-speaker, but functioning.

Ban listened to the familiar code. "—already," it spelled out to him.

"There were eight here, thirty more came this morning. Detroit has sent three of the rocket machines, and five of the frictionless, welded tank machines have crossed the country. They left an anti-friction projector set in each clan village they passed.

"We believe those two ships you destroyed were the last of the American fleet. Our new set though, caught a European station never before heard. We cannot get through to them apparently, till the new transmitter is finished to-morrow, because they have no receivers as sensitive as ours. But one of the Detroit rockets is making the one-way crossing to-night, though unable to return till fuel is developed there.

"Undoubtedly, however, our strong point of resistance here will protect Europe by drawing all the Granthee fire. The tank machines ring up at a distance of thirty miles, and the rockets are waiting.

"Detroit is preparing thirty-five more now, for production has been vastly speeded since the frictionless machine tools went into operation. Have your clansmen returned?"

THE SPEAKER fell silent. Old Hugh reached out a firm hand to the key, and Ban listened to his swift keying. "One, so far, at any rate. They will drift in now, for their fear is gone. He

has brought in a sample of the Granthee hand-weapon, powered by atomic energy; I see. He is beside me now—Ban Norman—so, if your rocket will come for me, I can join you in three hours. Ban Norman knows the language of the key; he can teach it to others."

"You said no others would learn, and Norman was weakening," sputtered the little dented speaker.

"Others will learn now. Another has come, and is watching through the broken window. He is trying to understand now. In six months we will have fifty trained operators, and perhaps ten men who can hook up apparatus."

"That is good, Hugh Thompson. Detroit just sent word that the rocket has taken off to pick you up. We will deliver the tank machine and the medicines you asked for in three days or so; the gang plow in two weeks. Can Ban Norman take the key now?"

"Yes," said Ban Norman softly. "Going to—Schenectady—Detroit—in three hours. Old Hugh—"

"What—what does it say?" asked the keen-eyed face at the window.

"It says, young Jim Duncan," old Hugh replied slowly, as Ban Norman slipped eagerly over to the key, "that the Granthee have suffered severe frictional losses, and—that man's hesitation is over, and not his civilization."

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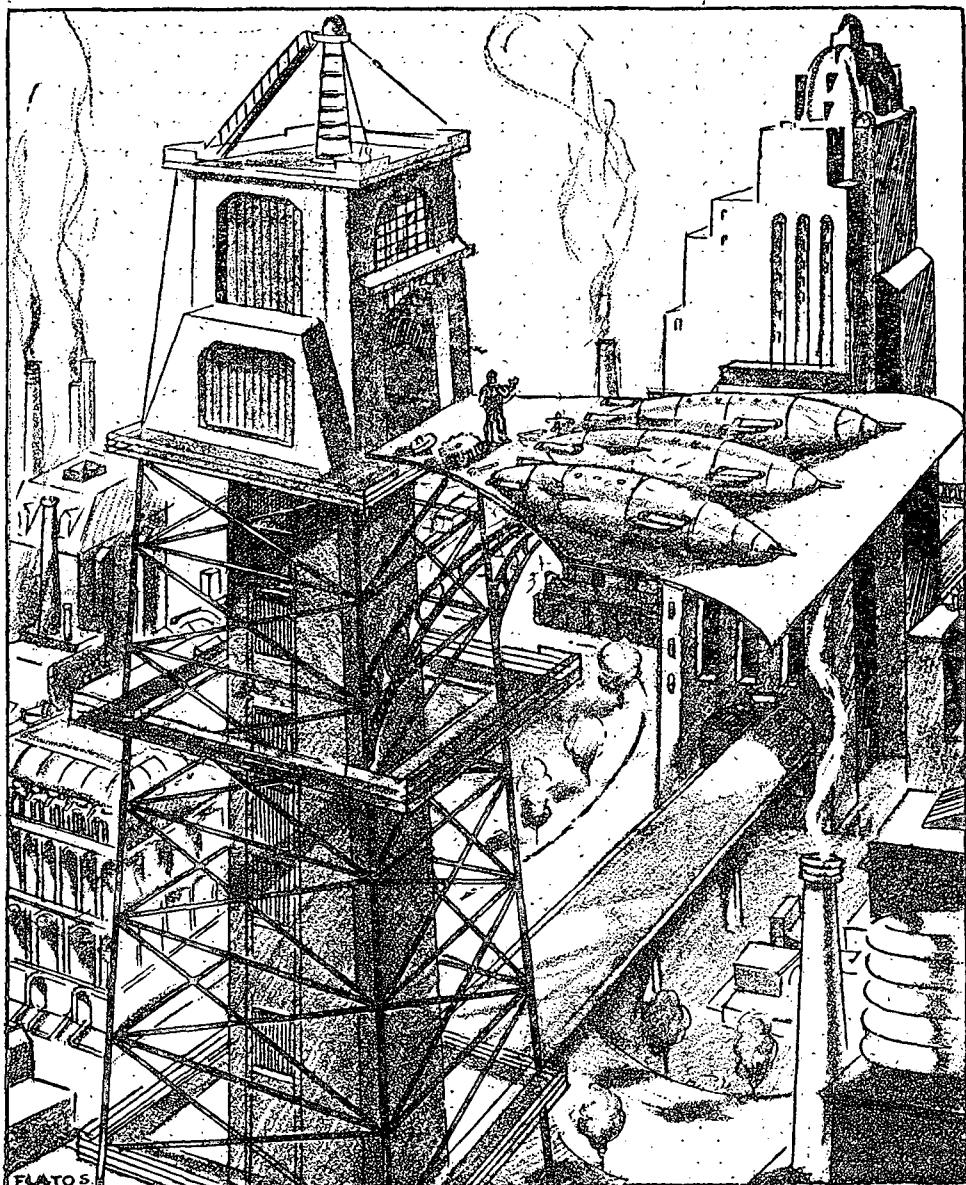
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AST-4



*It was the last stand of man. Every one knew it—
that if Girard failed, The Virus had won.*

The Virus

by R. DeWitt
Miller

AST-5

CONRAD VELDT stood looking at his own heart. It was slightly magnified by the amber liquid in which it was preserved.

One of the doctors standing behind Veldt leaned forward and tapped with a pencil on the side of the flat glass jar

in which the heart was kept.

"Here," he said, "is the cardiac deterioration which caused your death." The pencil indicated an ugly bulge on one side of the heart.

"You consider me dead?" Veldt smiled, as he adjusted the indicator on the small dial which he wore strapped to his wrist.

"Legally," the doctor replied, "you're quite dead. But scientifically you're more alive"—he paused and smiled a bitter, weary smile—"than any of us will be in a year."

The group about the heart was suddenly silent. Their tired eyes stared accusingly at the doctor who had spoken. For a moment their concentration on the scientific miracle which was being demonstrated had made them forget the specter of approaching doom which had haunted the earth for the last ghastly month.

Even Veldt had forgotten. In fact, the horror of that past month had been only a vague unreality. He had seen the news reports on a portable television screen while he was lying in his hospital room, recuperating from the operation which had brought him from death to a strange half immortality. But the realization of what was occurring on the panic-stricken earth had not struck home.

He had been too happy gazing at the warm sunlight which he had never expected to see again. He hadn't even spent much time enjoying the honor of being the first of the new race of men who would have in their breasts that steel heart which Dr. Zorto had perfected after a lifetime of patient experiments.

A sudden horrible thought flashed through his brain: Zorto's work wouldn't matter now. Death was going to win after all. Nothing mattered now—since The Virus had come.

For the first time the full sig-

nificance of the terror which gripped the world sank into his brain.

No wonder frantic, maudlin panic had followed the first reports of the ravages of The Virus. It had been four hundred years since any uncontrolled infectious germ had preyed on human tissue. Veldt remembered how he had once spoken to the class in medical history which he taught at the university.

"Gentlemen, it is time medical science stops congratulating itself on its eradication of infectious disease, and turns its eyes toward new goals. Since the year 2500 the world has been free of death from infection.

"But, gentlemen, death still exists. It still takes its toll. Accident, decay, and degeneration of organs and tissues are its weapons. It is against these the medical profession must fight."

Well, the medical profession—or at least old Dr. Zorto—had done just that. It had defeated the greatest cause of death: the failure of the human heart. Within Veldt's breast was the proof that the human heart could be replaced by a machine.

But it all didn't matter now—since The Virus had come.

IT HAD seemed incredible when the first of the victims gasped, shook with convulsions, and then passed into that strange paralysis which preceded death from The Virus. At first, the doctors had made light of the whole matter—said it was nothing but a few isolated cases of nervous decay.

But The Virus had gone on with its silent, deadly attack. The symptoms were always the same: first a vague lethargy, followed within a few hours by violent convulsions, which subsided gradually into that paralysis from which no one had ever recovered. It was in that last stage that the disease was the most horrible. For in that final paralysis the victims seemed to retain consciousness.

The eyes of the victims would remain alive hours after the rest of their bodies seemed to have died. They were haunting, frightful eyes, that seared themselves into the brains of those who watched the end. In that last frightful stage The Virus, attacking the nerve tissue of the spinal cord, destroyed all connections between brain and body. But up to the end the brain still lived and thought, struggling to break its terrible isolation and reach the familiar external world.

It was when the first autopsy was made that the truth began to come out. The examiners had discovered that the neural tissue of the victims had been completely destroyed—eaten out. So the examiners had reported—before they died.

It was then—in that first terrible moment of realization that the disease was infectious almost beyond belief—that it had been given its title: The Virus. From then on it had been called nothing else but The Virus, the final culmination of the race of infinitely tiny organisms which man had once believed he had defeated.

For that was exactly what it was—a supervirus to destroy a super-race. It had taken shaggy-browed, irascible Dr. Girard of the International Research Station to see the full significance of the creeping death.

"Microbes," he said, "are living things. They evolve—as man evolves. It is up to them to keep pace or die. During the last four hundred years man has had the better of it. He defeated the microbes—but he did not destroy them.

"For four hundred years they have been going through old processes of evolution, seeking to produce a new form that would stand the competition of modern medical science.

"Last month that form was born—a supervirus to fight a supermedical science. It has attacked our weakest spot:

our nervous system. It's up to man to get back on top—but the time is short."

How terribly short was attested by the unbelievable rate with which The Virus swept across the face of the earth, leaping over every barrier which science could devise, turning the world into a death chamber, with every being condemned to horrible extinction.

Shortly after he made his epochal statement, Dr. Girard had moved the research station, bag and baggage, to a tiny island in the middle of the Pacific.

BECAUSE of the frequent activity of the volcanic cone which rose from the center of the tiny bit of land, the island was uninhabited. It was therefore absolutely free from the infection. The two thousand miles of water which surrounded it would stop The Virus for a while. So, on the island, Dr. Girard assembled the greatest collection of experimental animals that the world had known. Thousands of anthropoid apes were kept in sealed glass cells. A complete laboratory had been fitted up, where a hundred picked scientists struggled to discover a serum or chemical combination which would destroy The Virus.

In two glass jars, sealed in an underground chamber, samples of The Virus were kept. The tiny specimens were drawn off through tubes for inoculation into the animals. Each infected animal was kept in its glass inclosure, the air from which was filtered, before it was allowed to escape. When a monkey died in its cell, the entire cell was dropped into the flaming caldron of molten lava which seathed in the crater of Mt. Kula.

It was the last stand of man. Every one on earth knew it, knew that if Girard and his assistants failed, The Virus had won. The isolation of those thousands of miles of water would stop The Virus for a while. But, eventu-

ally, it would jump, or some of the culture in the sealed chamber would infect one of the human beings on the island.

The monstrous irony of it wrenched a short, bitter laugh from Conrad Veldt. So he had been called back from death for this.

One of the doctors was explaining, in a dull monotone: "By an elaboration of the Zurton Technique the heart was removed by a few simple, quick strokes. The ends of the severed arteries were instantly attached to the valves of the double electric pump, and the pump started.

"Of course, the operation was accompanied by almost constant blood transfusions. The wound was closed, the control and power wires being brought out through a silver pipe inserted in the chest wall.

"Professor Veldt, will you open your coat, please?"

Automatically, Veldt obeyed. He was no longer interested in the matter. What difference did it make—to be brought back to a dying world?

"You will observe," the voice droned on, "that one set of wires leads to a small atomic-combustion generator which produces the power to operate the pump. The other set leads to this dial on his wrist."

He took Veldt's arm and extended it before the group.

"Naturally the glands and nerves of his body no longer regulate the speed of his heart. Yet there must be some way by which the blood pressure may be adapted to the changing needs of the body. This is accomplished by the rheostat here.

"By moving the indicator on this dial he can regulate the speed of the pump. The dial is calibrated to correspond with the number of normal heart beats per minute. Careful tests were made before the operation to determine the proper speed of the steel heart for any

body condition. Professor Veldt has a chart showing these speeds. He must, of course, make such adjustments as experience suggests.

"For instance, sleep, on this scale, would lie at about 50, normal life at 60 to 70, exercise at 85, and so on."

One of the observers leaned forward and touched the dial.

"What," he asked, "would happen if the pump should be turned to its full power?"

The doctor pointed at the nitron lamp which cast its mellow light about the room.

"What would happen if I sent a thousand volts through that lamp?"

"It would burn out."

"But first it would glow very brightly for a moment. That's your answer."

Veldt stared at the indicator for a moment, then he asked: "Just what would this moment of supervoltage, this instant before my brain tissue was destroyed, be like? How long would it last?"

The doctor shrugged.

"How should I know?" he said. "After all, no one has ever been known to try it."

SOMEWHERE in the room a buzzer whirred, announcing the evening news period. Dr. Zorto nodded toward his office where the television screen was located.

They straggled into the office and stood before the screen.

Through all the days of panic and death, the news reports had been maintained. The world felt somehow that they were the last hold on life and sanity. When they broke down, it would be the end.

Even before the news commentator spoke, the watchers knew that something of terrific importance had occurred. The dull weariness was gone from the face that flashed into view on

the screen. It was radiant with a strange, almost hysterical joy.

The voice which came from the amplifier shook.

"Dr. Girard reports new progress in his work. The resistance of the last group of monkeys treated with the X4 serum has increased so greatly that Girard believes one more set of inoculations may be sufficient to produce complete immunity."

The announcer's voice was hoarse, choked: "If that is so——"

He couldn't go on. He stood silent a moment, fighting for control. At last he said, "We are now transferring you to the station at the base of Mt. Kula, where Dr. Girard himself will give his report."

The screen went black. There was no sound in the little room but the buzz of the speaker as the connection was made. This would be the final proof. Dr. Girard would not arouse the hopes of the world, unless the facts were unshakable.

But Girard's face did not appear on the screen. The seconds were cut down by the hand of the silent electric chronometer above the screen, but the connection with the island did not come through.

The announcer's voice, shrill, frantic, spoke again from the blank screen.

"The island doesn't answer. Something must have gone wrong with their sending apparatus. We'll try them again."

The static buzzed. Then, suddenly, the screen was lighted.

But it was no ordinary, normal illumination. It was glaring, red. Against the crimson background tiny black figures moved desperately about, seemingly possessed by uncontrollable fear.

One of the figures came closer, until his face dominated the flaming screen. It was Dr. Girard. His face was smoke-blackened, his voice gasping. "Mt Kula," he said huskily.

His hand pointed to something in the crimson haze. His words were jerky, disconnected: "Eruption. Lava stream headed for the station. Gas—can't get near enough—send asbestos suits and helmets."

Static cracked. The voice from the speaker was suddenly cut off and the screen went black. The connection with the island was broken.

CONRAD VELDT turned away. Dimly he heard the announcer requesting that insulating suits and explosives be sent to the International Rocket Terminal for shipment to the island.

A strange lethargy settled over him. Somehow he felt that nothing would do any good. Nature had sworn a final war against man.

He adjusted the indicator on the dial and walked down the long passageway to the street. He wanted to have another look at the earth—the earth that would soon be dead. For The Virus would win. He was strangely certain of that now.

For a moment he was startled by the deserted streets. When he had last seen them, they had been filled with people. Above him, supported by a spidery tower of steelwork, was a rocket landing. He went to the elevator, pressed the button, and waited—but nothing happened.

At last he moved the heart indicator to 85 and started up the emergency stairway. It was strange not to feel his heart pounding as he climbed. There was only a slight increase in the steady vibration to which he had become accustomed in the last month.

The landing platform gleamed in the late-afternoon sunlight—but it was deserted. Three rocket ships lay side by side, their curving, torpedo-shaped bodies tarnished with weeks of disuse. Cables and gears were strewn about the platform, where they had been left when the last, short-handed crew had given

up the hopeless task of maintaining transportation.

Veldt remembered that he had heard a dispatch stating that only the most vital rocket lines were being kept in operation. He descended the stairway and started on down the empty street.

A few blocks farther he found a little group of people before a News Report Station. On the screen was the same crimson glow which he had seen in the clinic. Dr. Girard's face flashed into view. He looked years older than he had an hour before.

"Tell them to hurry," he begged. "The lava is pouring down the river bed where the station is located. Our only chance is to blast a new vent in the crater which will relieve the pressure."

He paused, and clenched his trembling hands. There was a queer ring of victory in his voice: "If we can save the station for two days, we'll win. The X4 serum has given positive results. All we need is a little more time. We can't move the station. It would take weeks to reassemble the apparatus and animals. Besides, a return to civilization would bring about unavoidable infection. That lava flow must be stopped."

Veldt turned away and went on down the street. He wandered through a deserted hotel and spoke to a few people who were on the street, their faces grotesque in their impotent infection masks.

Here and there flames from the Incineration Stations licked against the sky. Dozens of industrial plants had been turned into vast crematories where the dead, picked up by the sanitary patrols, were burned.

Whenever he passed a News Report Station he stopped and watched the screen for a moment. The scene no longer changed. There was always that crimson glow, those little black figures running frantically about.

HIS MIND was strangely disassociated from it all. The huge irony of his position acted almost as a drug, drawing a thin, soft veil over reality.

He knew that the insulating suits and the explosives had arrived at the island, that five desperate men, armored like weird caricatures of medieval knights, were staggering up the trembling mountain, carrying enough explosive to blast a huge vent in the cone.

But he saw it all as a disinterested observer. At last he wandered back toward the clinic, and paused once more at a News Report Station.

Dr. Girard was speaking again. His voice dull, hopeless: "Three of the last party were driven back. The others fell on the slopes of Mt. Kula. The entire surface of the cone is practically molten. The heat is so terrific that it sears the flesh even through as much insulation as the men can carry.

"The slightest hole in the suit or masks lets in deadly fumes. It's like trying to live in a furnace. Flesh and blood can't stand it. The men are willing, but their bodies can't hold out. Their hearts stop before they reach the vital spot.

"Bombing from the air has proven ineffective. The vast currents of heated air above the crater make accurate bombing impossible. Volcanic maps of the lava tubes indicate only one small area where the blast will be effective. And we can't reach that."

Conrad Veldt was no longer listening. One phrase from the report stuck in his mind. He revolved it round and round in his brain: The men's hearts wouldn't stand it. But you couldn't stop a steel heart.

For a moment he stood uncertainly. The last of the afternoon sunlight warmed his shoulders. The world seemed very pleasant—but it wasn't his world, not the old friendly world he had once loved. That had been before The Virus came.

Still there were a few brief days of life left him. He could join one of the pleasure-mad groups which struggled to cram a lifetime of pleasure into the days that were left before The Virus finished its job.

A picture flashed into his mind: He saw three men, burned beyond all resemblance to human beings, fallen on the slope of Mt. Kula—scientists laying their lives on the old altar where thousands of others had been sacrificed during the centuries of struggle to make the earth truly safe for man. And all those lives wouldn't matter—if The Virus won.

Suddenly he turned, advanced the indicator on his wrist, and ran toward the clinic.

Dr. Zorto listened a moment in puzzled silence.

"We can't ask you to do that," he said finally.

"You're not asking me. It's my life—since you gave it back to me—I can do what I please with it."

"But you don't know it will work."

"Those men who died on the slopes of Mt. Kula didn't know either." Veldt's gray eyes were steady. "When there is only one chance in a thousand to save a life, you surgeons take it. Isn't that right?"

Zorto nodded.

Veldt adjusted the indicator before he spoke again. His voice was controlled, even: "That's all I'm doing—only this time it's all the lives on this planet."

Dr. Zorto's voice was unsteady. He had brought this man back from death. It was a strange end to his experiment.

"Exactly what is it you wish?" he asked.

"A pass to the island. You have the power to get one. There is a main-line rocket leaving for the International Terminal in fifteen minutes. Have the pass ready for me when I reach the International Terminal. I ought to get to the island in two hours."

Dr. Zorto's lips moved, but he did not speak. Finally he nodded and turned away.

VELDT stepped from the rocket and into the aluminum disinfecting chamber on the island. The door crashed shut behind him. He picked up a mask, seated himself on a bench, and signaled for the antiseptic gas to be turned on. For ten minutes a stinging gray haze filled the chamber, then the far door swung open and he stepped out.

He blinked a moment in the intense crimson light. Above him towered the cone of Mt. Kula, its top hidden by smoke clouds, through which played fitful flashes of fire.

A man stepped forward. Veldt recognized Dr. Girard. He held out his hand.

"I told Dr. Zorto to explain matters by radio," Veldt said. "Did you get his message?"

"Yes—we've arranged everything—if you still want to go through with it."

Veldt smiled. "Of course."

"There's no chance of your coming back."

"I'm living on time that shouldn't be mine, anyway."

"It means torture more terrible than any human being has ever faced, pain so terrific that it paralyzes a normal human heart. Yet you must keep going."

Veldt looked at Mt. Kula. His face was reddened by the leaping sheets of flame from the peak. The door of retreat, he thought, was still open. But the way of science had never been back.

"How will I know where to place the charge?" he asked.

"There's a short-wave radio in the insulating suit. We'll direct you with that. Besides, we'll keep searchlights on you as much as possible. But I'll point out the spot to make sure." He

handed Veldt a pair of powerful binoculars. "See that jutting ledge formed by an old lava flow? At the base of that."

Veldt nodded. "Where's the suit?"

Two men helped him into the ponderous garment. Just before the helmet was clamped into place, Dr. Girard started to say something, but Veldt smiled and shook his head.

Into his gloved hands were pressed a flask of Zylite, the explosive whose terrific potency had caused war to be abandoned on the earth, and a detonator. The Zylite could not be exploded by heat.

The dial of the steel heart was strapped on the outside of his arm, the wires running through a tiny hole in the suit, which was closed with strips of insulating material.

A small tractor, powered with an atomic-combustion generator, carried him as far as possible up the slope of the cone. Stiffly he climbed from his seat, shook hands with the driver, turned, and started up the remaining distance to the ledge which showed fitfully through the clouds of gas.

He followed a ridge of old lava which led obliquely toward the spot where the blast was to be placed. The ground was shaken almost continually by subterranean explosions. Queer, erratic currents of air whipped the clouds of smoke and steam which rose from the crater.

For a few paces he would walk through the hot, impenetrable gas clouds; then, as the wind whipped them away, the white beam of the searchlight would find him, and follow his progress.

TIME AFTER TIME, he was thrown to the ground by the quakes which shook the cone. Each time he got awkwardly to his feet, struggling to raise the weight of the heavy insulating suit.

After every hundred yards or so, he

advanced the indicator on the control of the steel heart. He tried to estimate the distance and save sufficient reserve speed to carry him to the ledge.

Gradually, he began to feel heat creeping through the soles of his huge, insulated boots. At first, it was only a pleasant, gentle warmth. But inexorably it increased until it became an endless, searing pain, that wrenched mumbled, inarticulate words from his lips.

The whole thing began to take on the same strange feeling of unreality which he had felt that afternoon. It seemed as if he had never awakened from the anesthetic before the operation which gave him a heart that wouldn't stop. This was only a red nightmare which the anesthetic had instilled in his brain. He'd wake up in a moment and come back to the world he knew—his world.

He told himself over and over that it was all real—that his world didn't exist any more.

But he couldn't drive away the dream feeling. This couldn't be real. No man could stand the frightful, agonizing pain which came from his scorching feet. He looked down. The insulating boots were beginning to melt. They were becoming a sticky, formless mass.

He made a final effort to break the spell of unreality. His fumbling hands advanced the indicator to the limit which human tissues would stand. He felt as if a great stream of madly rushing water was surging within him, seeking to break through its banks and escape. There was a terrific roaring in his ears. He could no longer hear the directions which were coming through the ear phones strapped to his head.

For a moment his mind cleared. The defense of unreality which his tortured body had established was broken. The pain, no longer dulled by the dream feeling, welled up in an unbearable flash of agony. He felt it searing into every fiber of his being.

But in that instant of sanity he saw that he had almost succeeded. A gust of superheated air tore away the clouds of steam, and showed him the ledge a bare fifty yards away.

Foot by foot he fought his way toward it. His suit was burned through in several places. He felt the deadly fumes begin to dull his brain.

Suddenly he saw that he was beaten.

Between him and the ledge were yards of molten, steaming lava. He couldn't cross that. The stream might hold his weight, but he would be incinerated before he had taken half a dozen steps.

He wondered whether this was close enough. It had to be. It was the best he could do. It was far more than any normal human body could stand.

Vaguely in his dimming brain he remembered something Dr. Girard had said while he was pointing out the location of the subterranean lava tube.

"The tube is slightly beyond the ledge, but I think a charge directly at its base will do the job."

Conrad Veldt stood swaying on the edge of the stream of flaming lava. As a child remembers the exact wording of its mother's order, so he remembered the phrase: directly at the base of the ledge.

An idea began to form in his brain. His hand was already fumbling with the dial, when he realized the full significance of this last card he had to play.

"It would glow very brightly for an instant," the doctor had said.

One instant of superexistence—one last obstacle to cross.

Conrad Veldt's charred lips muttered: "Give back to science the life it gave me."

His raw remnants of fingers found the indicator and pushed it forward—as far as it would go.

An intense exhilaration swept over him. All those things which once had

seemed dark, all the problems of science which he had sought to solve at the university, seemed simple. A thousand years of life and an infinite understanding were compressed into that instant.

Time and space blended and became something far off and unreal. Their inscrutable mystery seemed simple, as simple as this little thing he still had to do. What had he been worrying about? Any fool could do this.

As from a great height he saw a tiny figure leap far out over the stream of lava, leap as human muscles had never leaped before.

With a final, terrific effort he brought his mind back to the charred thing that lay at the foot of the ledge, and drove home the plunger of the detonator.

THE WATCHERS at the station saw the stream of lava descending the valley hesitate, and start again at a slower pace. Gradually, as the hours passed, the movement became slower and slower—until finally it stopped.

A new stream was pouring from a great rent in the side of the cone, and running harmlessly to the sea.

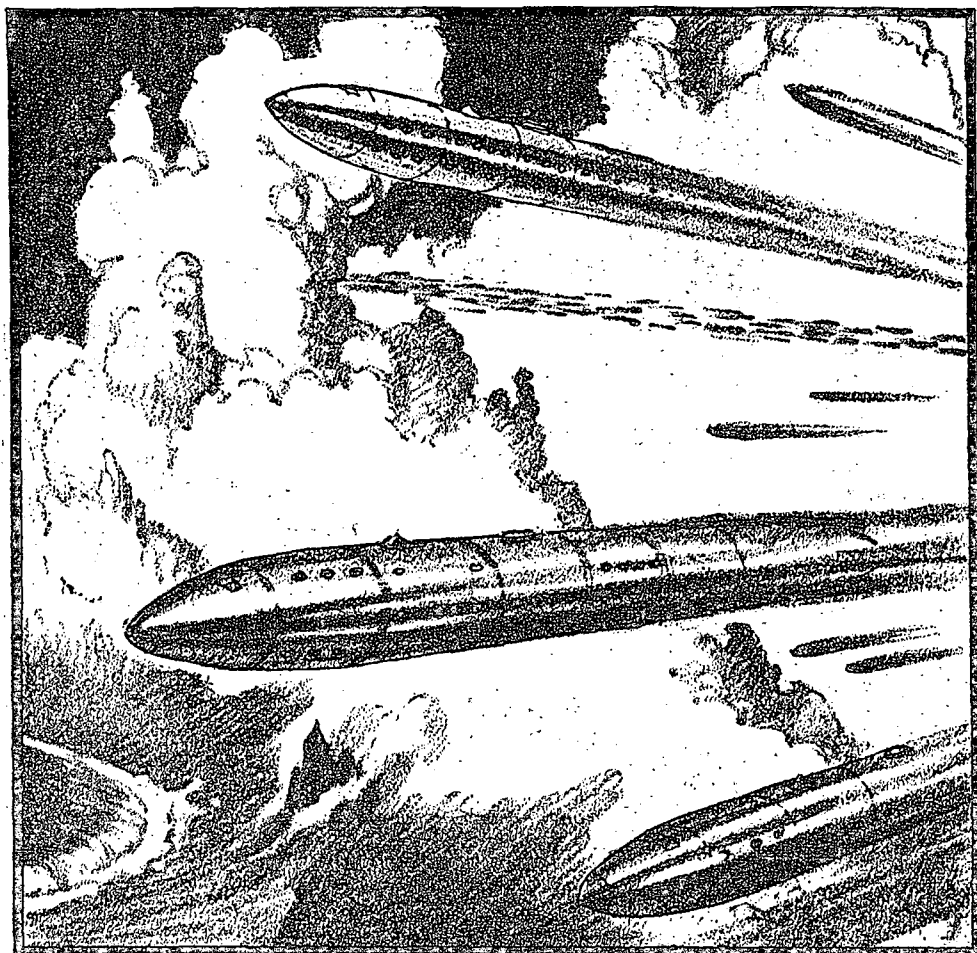
At dawn Dr. Girard was still staring at the mountain. An assistant touched his arm, and motioned him toward the laboratory.

In silence they walked down the long corridor to a glass cell where a small anthropoid was solemnly playing with a piece of string.

"That ape," the assistant said slowly, "was inoculated with the last batch of the X4 serum. We have made every effort to infect it with The Virus. It is absolutely immune. Shall we begin producing the serum in large quantities?"

Dr. Girard nodded.

"Send out the final report," he said. "Say that The Virus is beaten—by a man without a heart."



PACIFICA

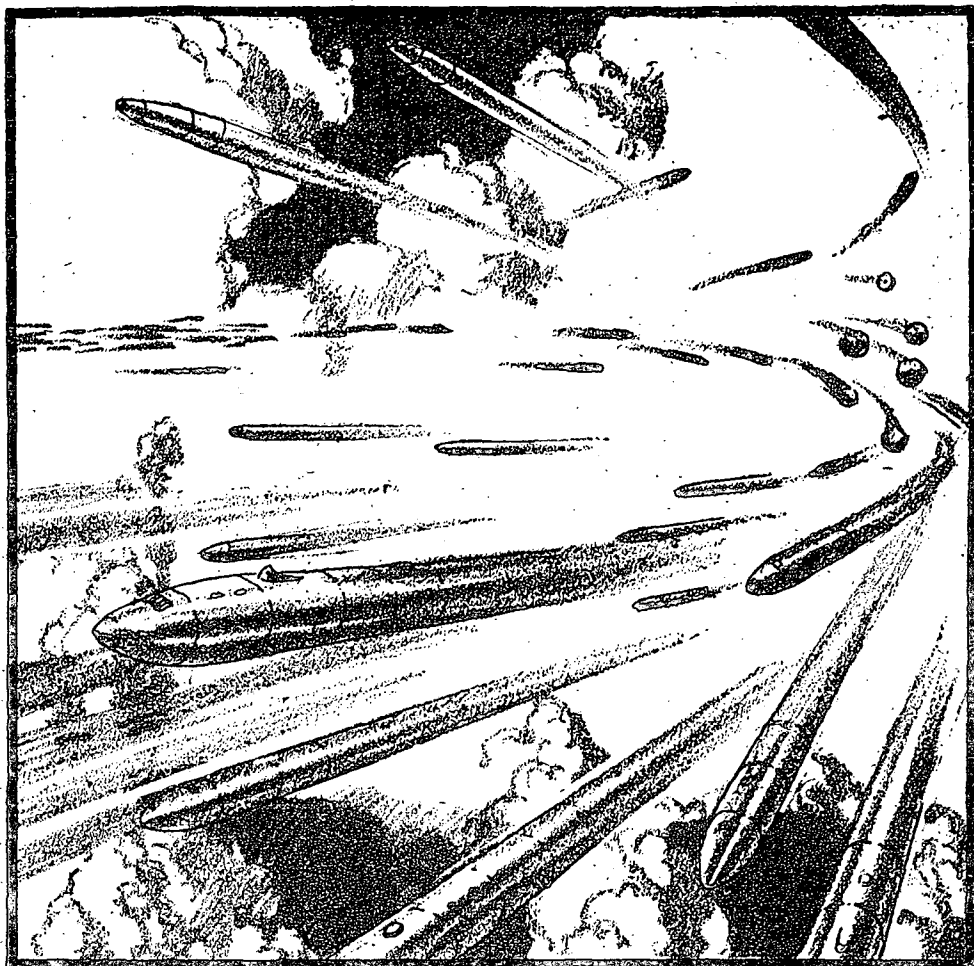
*A Novel of Man's
Super-Science*

by Nat Schachner

NOT ONE in a thousand of earth's teeming millions had ever heard of the island of Kam prior to the year 1985. It was merely another of those inconspicuous specks of thrust-up volcanic slag and lava that dot the wide stretches of the Pacific, to the despair of cartographers and the delight of ships weary of sailing the interminable blues and grays.

The volcano had long since ceased its smoky activity, and the weathering of uncounted centuries had softened its hard, truncated outlines, worn down its scoriaceous lava and basalt rock to crumbling, fertile soil. The vagrant, spore-laden airs and tropic, precipitant moisture had done the rest.

Yet, in the year 1985 the hitherto unknown Kam leaped violently into the



*On they came, directly toward the island, streaming behind
the sword flashes of flame—*

focus of the world's attention, and held the very pith and center of the newscasters' animated headlines for a long quarter of a century—held them with such increasing fervor and intensity that by the end of the crucial period everything else was relegated to the limbo of casual comment and hasty summaries forgotten almost before the last words had droned from the televisors.

There had been a flare of revolution in China. The subject race, groaning within the iron barriers which the Eastern Empire had raised against their

starving billion of people, had risen from the abysses of despair and been crushed back again in a hideous welter of blood and ruin.

A new dictator had appeared in Europe to contest for a division of power with the overlord and had won a compromise.

A strange projectile had been discovered buried deep within the soil of the Mojave Desert, which, when opened, had been found to contain documents of strange, unearthly material and inscribed in a tongue not known to human-

kind. It was obviously an attempt at communication from another world. Every day the scientific laboratories of the several nations, working at feverish speed, announced new and important discoveries in science, most of them, unfortunately, in the way of more powerful and more destructive instruments of war.

But these events, which, prior to 1985, would have engrossed the whole attention of the human race, were now dismissed with impatient shrugs, while the listeners at the newscasts settled down to further and interminable discussions of the mighty drama that was taking place on Kam.

By the end of the year 2110 the emotions of the world were aroused to an almost unbearable pitch. The climax of a quarter century of incessant toil, of the straining resources of the five great political segments of mankind, was in sight.

The date had even been set for the ultimate, the supreme trial. On the success or failure of that event depended the fate of countless millions of earth's overflow, on it depended whether or not instant and bloody wars, more horrible than any in all earth's history, would be unleashed in the last desperate struggle for expansion, for a place in the sun.

A place in the sun! Dreadful phrase, that far back in 1914 had led to unutterable anguish—a mere metaphor then—but now a grimly real thing, with definite meaning and content.

For the blessings of advancing science had turned into a curse and a nightmare. Not because of anything inherently wrong in the vast structure that man's noblest thought had raised as a shining tower to the stars, but because man's inner nature—in the mass, that is—had not kept even progress with his intellect.

DISEASE had been definitely conquered. The non-filterable viruses had been discovered to be the simplest form

of life—single organic molecules—and their properties thoroughly explored. A unit serum, injected into babes at birth, gave effective immunity against germ and disease for life.

The span of mortal years had been considerably lengthened by a new method of cleansing the human blood stream of cumulative waste, thus retarding the calcifying and other hardening processes.

Cancer, a thing of normal cellular growth running wild, had been controlled by inhibitory solutions of the organic salts of osmium and iridium.

Heart surgery had developed to a stage where transplanted tissues could be grafted on to leaky valves without that delicate organ missing a single beat.

Man refused to die, yet he did not cease to propagate. The dictators saw to that, and in sheer self-defense, the solitary democratic unit of the Americas and Great Britain was perforce compelled to follow suit. For each of the dictators, animated alike by ineradicable lust for power and greed for aggrandizement, urged upon their supine subjects the need for bigger and ever bigger families: boys to man the rocket fleets, the underwater cruisers, the swift battleships; girls to keep the munition plants at full blast, to till the soil, to breed more fodder for the insatiable machines in endless, repetitious cycles.

The result should have been obvious even to the purblind. The human race increased by leaps and bounds; it swarmed to bursting over the hitherto unoccupied territories of the planet; it planted colonies on the desert wastes, on the inhospitable ice of arctic islands and the vast, subzero reaches of the antarctic.

Soon even that did not help. Tens of millions teemed where only millions had lived before; the continents were continuous stretches of hundred-storied cities; agricultural lands were more precious than radium mines.

Science battled valiantly to feed and

adequately care for the swarming ant heap of humanity, but it was a steadily losing fight. There was only one thing left: war! War with frightful engines of destruction; was to rid the earth of its excess millions; war to conquer and eradicate so that one's own people might find room to expand in the new-made wastes.

The dictators set to work. Carefully engineered incidents occurred. It required but a spark to set the entire world ablaze. The Americas protested in vain, offered to lead a great movement for restriction of births. The dictators would not listen. Their folly had outrun them. Besides, they rightly suspected each other, fearing secret accouchements, the rearing of potential soldiers in sub-rosa establishments, and the consequent dislocation of delicate balances of power. War loomed ominously near.

THEN it was that Adam Breder came forward with his astounding plan. The nations gasped, listened with diminishing skepticism, and halted temporarily their vast mobilizations. Had it been any one else who evolved such a fantastic scheme, he would have been pronounced mad and forthwith shut up in an asylum. But Adam Breder could not be treated in such a manner. His fame as an engineer transcended the bounds of nationalist hatreds.

It was he who had driven a tunnel under the twenty-mile-wide waters of the English Channel to connect England and France. It was he who had made a fertile, well-watered land of the burning sands of the Sahara, by an ingenious system of huge underground caves into which the diffuse subsurface waters could filter and collect, and be ultimately raised to irrigation ditches by mighty pumps.

It was he who had performed the incredible feat of building a dike that extended out into the Atlantic from the

farthermost spit of Newfoundland, and which diverted a portion of the Gulf Stream as it flowed past on its eastern journey toward Europe, back against the coast of Newfoundland and Labrador, thus making those bleak lands mildly tropic and capable of supporting extensive populations.

In fact, had it not been for his genius, the inevitable day of suffocating overpopulation would have been reached a decade earlier, and the world have been in ruins by 1985. Now he came forward again, with this final measure to stave off starvation and death from an overpopulated world. It was so breath-staggering in its vastness of conception and daring of theory that even Adam Breder's reputation was barely sufficient to gain it a hearing.

It was nothing more or less than to raise an entirely new, virgin continent out of the slime and ooze in which it had lain enshrouded for uncounted millions of years!

"Look!" He had stabbed with his long, musicianly finger at the huge map spread over the wall. "Once upon a time all this area was a vast, fertile continent. Now it is a waste of waters dotted by islands that are only the peaks of mountains too high to be entirely submerged."

He swung around to the representatives of the great powers of the world. His voice grew strong with the enthusiasm of the seer, of the genius who is a single-track enthusiast.

"A waste, gentlemen! A sheer, inexcusable waste! Down there, less than two miles beneath the shrouding Pacific, lies a continent, a million square miles of land! Restore that to the surface, and all your problems are solved. Room for your excess populations, unimaginably fertile soil, manured with millions of years of dripping organic ooze, lush, tropical climes! Good Lord, gentlemen, I don't see how you can hesitate an instant."

WALLACE, the British-American representative, smiled wanly. That was just like Breder, of course—a great engineer, yes, but a child in all other matters, in spite of his seventy-odd years.

He looked around at the others, noted their sidelong, suspicious glances as they weighed and probed each other from under veiled lids. He knew exactly what was passing in their minds, the lightning calculations that were being made, the half-skeptical, half-greedy plans that were forming in their subtle brains. Wallace sighed. Almost he wished that Breder was, in truth, a madman, a futile visionary.

Breder was staring anxiously, almost pleadingly, around the circle of the great, seeking in vain for approbation of this latest and most-daring vision of his. Wallace broke the tense silence with which the others masked their thoughts. "It sounds good, Breder," he said, "but a bit incredible. Raising a submerged continent out of the Pacific, two miles up. You've done great things before, I know; but this—well, just *how* would you do it?"

Breder flared, subsided quickly. He was like that, so engrossed in his schemes and calculations that it seemed impossible for them not to be as simple and luminous in their plain truth to others as well as to himself. He was always forgetting the unaccountable stupidity of laymen, whether they were poets or ditch-diggers or statesmen.

He looked again at these close-mouthed gentlemen who, in the persons of their immediate superiors, ruled the world. There was manifest contempt in his gaze for their profound ignorance of science. Good Lord, he must explain, talk baby talk so that they might understand! The rightness and swift shorthand of mathematical equations were not for them.

"The theory," he said slowly, "is very simple. The practice, I grant you, might prove difficult, but," and he lifted

his ascetic, finely chiseled head with unconscious arrogance, "you don't have to worry about that. I can overcome all physical difficulties." And such was the magic of Breder's reputation that no one of the watchful representatives murmured dissent, even in his thoughts.

"You may or may not know," the engineer went on, "that the solid surface on which we live and have our being is not an accurate sample of the entire earth. It is, in fact, only a crust, and a mighty thin one at that. Through various methods, notably by observation of earthquake tremors, it has long been known that this solid crust is only some sixty miles in thickness."

N'Gob, the African, shivered. He had not gone in much for science. "And what's underneath? Fire?"

Breder smiled. "No. That's a theory which has been discarded ages ago. In fact, after a certain depth of basalt and other materials, the central core of the earth is composed almost exclusively of the heaviest metals, chiefly iron and nickel. But this is the point. They are under tremendous pressures, and naturally, the deeper we go, the greater the pressure from the overlying masses. At 100 miles down it is 600,000 pounds per square inch; at 800 miles it rises to 7,500,000 pounds, and at the center of the earth it reaches the incredible figure of 45,000,000 pounds to the square inch. These are pressures that we never have been able to duplicate in the laboratories—pressures that even at 60 miles down, make of rock and metal something new, something unknown on the surface."

The Eastern Empire diplomat looked bored. He was not interested in this. What was vital to him was another matter. Should Breder prove to be right, who would control this vast new territory that would rise dripping from the ocean's bed, almost at the very doorstep of his master? But he murmured now only a polite: "And what is that?"

"A plastic material," the engineer an-

swered quickly. "A single homogeneous unit so compressed that it no longer possesses the properties of solids as we know them. In fact, for all intents and purposes, the core of the earth partakes of the nature of a liquid—a liquid, it is true, tremendously heavier than water—yet essentially the same in its obedience to the laws that govern fluids."

Wallace nodded. Of course, he had known that. So had the other delegates, with the exception of N'Gob. There was nothing new or startling about this thesis. The principle of isostasy, that is, the condition of equal balance of rock weights all over the earth, showed that the earth's crust was a solid floating on a plastic core. But what was Breder driving at?

THE ENGINEER saw his gesture, smiled. "I'm coming to the meat of the matter," he said. "What I've told you is elementary, so is the next principle I am going to enunciate. But no one before has ever put the two together and envisaged their possibilities."

The South European delegate stirred impatiently. The dictator was waiting at the televisor for complete details of this interview, and time was passing. It was not good to keep the dictator waiting. "What is your second 'principle?'" he demanded.

"Pascal's law."

They looked blank at that, even Wallace. Somewhere in the back of his head stirred faint memories of school-boy days. He had heard the name before, knew it related to physics, but for the life of him he could not specify now what it was.

Breder shook his head scornfully. He never could understand that these men were diplomats, not scientists, that things once learned could ever be forgotten.

"Pascal's law," he explained, "is the fundamental law of hydraulics. It states simply that pressure applied any-

where to a body of confined liquid is transmitted undiminished to every portion of the surface of the containing vessel. Do you see the connection now?"

"Hanged if we do," N'Gob said bluntly. He was more direct in his acknowledgment of ignorance than the others.

Breder groaned inwardly, set himself to put things in the easiest possible terms. "I'll try to restate it in practical terms. If you apply a force of one pound to one square foot of the surface of a liquid contained in a vessel whose total surface area is 1,000 square feet, that one-pound force will be transmitted by the liquid so as to act with a force of one pound on each square foot of the container. In other words, the total force exerted by the original pound will be 1,000 pounds. It's the motivating principle of the hydraulic press. Now do you see?"

Wallace groped vaguely. "I—I'm afraid I don't," he murmured apologetically.

"The entire earth is such a container," the engineer went on. "Its central core is fluid, plastic; the outer solid crust is the containing surface. Suppose I apply a concentrated force to a limited area of the inner core, even to a square yard. That force will surge through the unimaginable density of the central earth, will beat with undiminished power against every square yard of the earth's surface."

"Pascal himself saw this dimly when he exclaimed that a vesselful of water is a new machine for the multiplication of force to any required extent, since one man will by this means be able to move any given weight. Yes, gentlemen, with the proper concentration of force at the proper point, I can lift even a million of square miles of ocean bed upward for a distance of two miles to create a new continent."

They leaned forward eagerly, puzzled. These men were trained in the tortu-

osities of diplomacy, not in the luminous simplicities of science.

"But where is the proper point?" demanded the North European.

Breder grinned. "Sixty miles beneath the surface of the earth, on the island of Kam," he answered promptly.

"Sixty miles down," gasped N'Gob. "How will you ever get there?"

"By boring a hole."

NOW he had his sensation. Every one spoke at once, even the inscrutable representative of the Eastern Empire. It was impossible, absurd, even for a man like Breder. Sixty miles, when the furthest depth yet reached was a paltry seven miles. The increasing heat, the pressure—there were a million and one obstacles.

Besides, what would hold the continent up? The principle of isostasy, of equal balance—this was Wallace's contribution to the turmoil. And how limit the force? If Pascal's law were true, if the core were really plastic, wouldn't the entire earth's crust lift bodily, with unimaginable consequences?

Breder cut sharply across the babble of voices. "Gentlemen," he said with quiet arrogance, "I did not come to you with a half-baked idea. I have considered it for a year, tested every angle. Let it be sufficient when I say that I have invented the necessary apparatus to bore through solid rock and basalt for that distance and more; that I can take care of any conditions of heat and pressure that may arise.

"As for Wallace's more scientific objections, I have made a careful survey of the area of the sunken continent. The reason it sank, eons ago, the reason it is now a highly volcanic temblor region, is because at present it violates the very principle of isostasy he mentions. Underneath, my instruments disclose a huge vault, filled with an upthrust from the central core of the

tremendously heavy and compressed nickel-iron fluid.

"To compensate for its weight the continent sank and the lighter ocean waters rushed over it in a vain attempt to create a balance. It was not successful. The entire region is very unstable; the volcanic eruptions and numerous earthquakes testify to the attempt of nature to create once more a condition of stability, of isostatic balance.

"By raising the continent once more, by pressing the heavy core fluid out of the fault, the balance will be restored. This fault, to all intents and purposes, is itself a closed container, cut off by basalt formations from the much deeper inner core. That is why only the submerged continent will rise, and not the whole earth."

II.

IT TOOK MONTHS before the mutually jealous nations of earth finally agreed upon the scheme; months of scientific fact finding, bickerings, and jockeying for advantageous positions. This last was the most important.

The Eastern Empire had clamored for complete control of the hypothetical continent of Pacifica. It was, they argued, strategically at the threshold of its domain; most of the islands that would be obliterated and fused in the new land belonged to them. Kam, however, the scene of the proposed operations, was a British-American possession. And, they went on with bold effrontery, it was necessary to their national needs. Their populations, dominant and subject alike, were more procreative, than all the others combined.

It was this exactly that the rest of the world feared. Negotiations were abruptly broken off. The war clouds gathered again. Mobilizations recommenced. Then, suddenly, unexpectedly, the Eastern Empire yielded. It agreed to all demands; the partition of the area,

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when and if raised, equally among the five great powers; the demilitarization of the new continent, and mutual guarantees as to its inviolability; a birth-control system, universally applied, so that with this increased area for colonization, the future would be insured against further population pressure.

Wallace shook his head in the secrecy of his conference with the president of the British-American Union. "I can't understand it, sir," he admitted. "The emperor of the East has given in too suddenly and too completely. It isn't like him at all! I'm afraid he has something in reserve, something that may spell trouble."

The president was old and war-worn. "Chu-san is a young man. He expects to live a long time," he murmured cryptically. "But at least we have a breathing space. For the twenty-five years that Breder has calculated it will take to finish the job there will be no war. For that much we may be thankful. After that——" He shrugged his shoulders and turned away. He would be dead by then, thank Heaven, and younger and more vigorous men would arise to deal with the future.

Adam Breder started work, happily content. The squabbles, the political implications of his colossal task, disturbed him not at all. It was purely and solely an engineering problem with man's brains pitted against the senseless resistance of nature. Five hundred millions were voted him, ten thousand men put to work. The island of Kam became the busiest spot in the Pacific. Cargo planes, great submersible freighters, shuttled to and fro like swarms of speeding insects.

The engineer had chosen his spot well. The old volcano was silent, but its shafts still pierced deep into the bowels of the earth. It made things a bit easier. Day and night, restlessly, remorselessly, the work went on. Deeper, ever deeper, bored the great

carbostele drills of Breder's special invention. They went through granite, basalt and the toughest metals like so much butter.

Down, always down, day and night, weeks and months and years. The former seven-mile record was soon surpassed. They were boring now through the great underlying granitic structure of old earth, through rock that had never seen the light of day since time began.

THE SPEARHEAD of the working force crouched behind the great drills for not over two hours at a time, then they were hauled in fast elevators to the surface for long rests. Behind them came the mopping-up crews, widening the tremendous shaft to the required dimensions, facing cracks and weak spots with cement of a special formula that hardened quickly to the toughness of the surrounding granite, installing communications, elevators, removing the tunneled rock for dumping in great scows far out on the Pacific.

The worst problems that Breder encountered were those of adequate air supply, and the steadily mounting heat and pressure. But these had been solved by him theoretically long before the first drill bit into the volcanic shaft, and worked just as effectually in practice.

Air was pumped down under pressure through a subsidiary tunnel, and expanded at the bottom before being released. This not only provided a constant supply of clean, sweet air, but solved the other difficulties as well.

The swift expansion of the gas produced subzero temperatures—a principle thoroughly understood back in the nineteenth century—and the immensely cold currents of air were conducted along the walls of the shaft so as to cool the pressure-hot surfaces and at the same time reabsorb sufficient heat so as to render it breathable to the workers. The

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waste products of respiration and excess air were then forced to the surface by a series of pressure pumps and exhaust fans so that there was always constant circulation, sea-level atmospheric pressure and normal temperatures. It was a triumph of delicate balance.

Not that there weren't other problems, gigantic, heartbreaking. But Breder took them all in his stride. Unfortunately they grew worse as the years of ceaseless toil went on, and greater and greater depths were reached.

Breder was getting old. It was not alone his age, but he had refused to spare himself. The man seemed never to sleep; at all hours of the eternal day that reigned artificially at the bottom of the thrusting shaft he was on the job, exhorting, directing, calculating in his mobile office, meeting Cyclopean emergencies with swift decisions.

There was, for instance, the terrible time when a vast pocket of lava, cut off unimaginable ages before from the quiescent volcano, erupted suddenly along the probing drill, and rose with hideous speed up the tunnel vent. But Breder was prepared. Huge locks of fire-resistant material, with interlocking gates, kept even pace behind the whirling drills, two hundred yards above.

At the first clamor of the warning alarms, the great gates slid impenetrably shut, and the seething lava beat in vain against the asbestopor material. But two hundred men had been caught and crisped to ashes, and a million dollars' worth of material had to be replaced.

Breder shook his gaunt head indomitably and drove on. It happened not once, but several times. There were mutters of revolt from the scared workmen as they went down and down, ever closer to the central core. But the engineer was ruthless and the special international police backed him up. What were a thousand lives to the completion of his task, to the future welfare of millions of people?

The engineering problem involved concerned him far more. Some of the lava pockets were limited in area, and could be skirted by cautious exploratory shafts. But others seemed indefinite in extent, vast lakes underlying the rocky structure. Here he employed a new technique.

He literally froze a cylindrical core of the magma by injecting inexhaustible jets of glacial air into the bubbling mass. It was tedious, terribly slow. An inch at a time, a foot a day, but steadily the solid core expanded to safe proportions, and within it the devouring drills went on and on until solid granite was once more reached. One molten pocket took over a year to penetrate.

III.

AT the twentieth year of the Gargantuan task, Breder suddenly collapsed. He was well over ninety now and the terrific driving strain of those two decades had finally worn down even his superhuman energy. He was a shrunken old man, a mere palsied ghost of his former self. The doctors examined him, and pronounced him in no immediate danger, but they ordered him peremptorily off active duty.

A great wail arose from the nations of the world. The shaft had reached the incredible depth of almost fifty miles. There was still over ten miles to bore, but the difficulties were piling up in geometric progression with each foot of progress. Granite had yielded to basalt, the pockets of lava were becoming increasingly numerous, the gravitational increase of weight was becoming more pronounced, the problems of ever-lengthening communications with the surface, the ever-increasing temperatures, air supply—everything was rapidly approaching a climax.

There was also still ahead the supreme task of all. Breder himself had admitted that the driving of the shaft was

child's play to what would necessarily follow when the inner plastic core was reached. While it was true that his delicate torsion balances and the results of electrical echoes had disclosed a tremendous thrust of nickel-iron from the very bowels of the earth along the entire bed of the Pacific, that was to be the new continent and had once been an ancient land, still there was room for error.

Furthermore, even if everything went according to schedule, the proper point of application of pressure, the installation of the superpowerful engines required, the almost superhuman mathematics necessary to calculate the infinite factors involved, so that catastrophe might not ensue, pointed inexorably to the guiding hand of a man of almost godlike proportions. And the world knew of only one such—Adam Breder!

But the old engineer knew better. He had been quietly grooming a successor right along for just such an emergency. During the long twenty years his corps of assistants had grown, expanded and shifted from time to time as young engineers joined up eagerly, finding this tremendous enterprise the one bright ideal in a world of otherwise tawdry nationalist hatreds and iron dictatorships and pitiful human suffering.

His staff, at the moment of his breakdown, was quite cosmopolitan. There were engineers and technicians from almost every country in the world. But the inner circle of his trusted assistants numbered four. Nijo, the Easterner, was the senior in points of years and length of service. He had been at Kam from the inception of the project, a short, squat, middle-aged man, with veiled, slumberous eyes and the inscrutable expression of all his race. But his brain was razor-sharp and his energies adequate to any task imposed.

Nevertheless, Breder had never liked him. There was something secretive, coldly contained, about the man that

made the engineer uncomfortable, and no one else before or since had been able to do quite that.

There was also Gregori, a North European, tall, fair-haired, placid to the point of sheer bovinity. Yet there was no one in the world, not even Breder, who could equal him in the handling of intricate mathematical equations.

OVER Kai-long there had been a prolonged struggle. He was Chinese in origin, a round-faced, yellow-skinned representative of a subject race, whose coal-black eyes flamed always with ineradicable anger.

On his head the Eastern Emperor had laid a price; he had fled his native land after an abortive revolution and sought sanctuary with Breder. The old Scotchman had granted it to him promptly; more, he had placed him on his staff at once. Kai-long had a reputation as an engineer.

Complications arose immediately. Chu-san demanded his delivery as a rebellious subject. Breder stubbornly refused. An attempt by Eastern members of the police unit on the island to seize him forcibly was met with armed resistance by the others of the international force. Great Eastern bombing planes blasted their rockets out over the Pacific. The chancellories of the other nations went into alarmed huddles.

But Breder cut the Gordian knot. Dramatically he announced that if Kai-long were seized or harmed in any way, he, Breder, would personally detonate the entire tunnel and bring to naught the toil of years and the expenditure of uncounted millions of dollars. Whereupon Chu-san incontinently backed down.

For the pressure of his hordes was bursting the boundaries of his empire. Unless the promised Pacifica were soon lifted to the domain of reality, they must of necessity spill over into regions already crowded beyond endurance. And that meant immediate war, for

which he was not yet properly prepared. So he nursed his rage in the privacy of his Himalayan fastness, and bided his time. Regularly he received reports on a directional-beam code from the island of Kam that tightened his lips, and brought his brooding plans closer to eventual fulfillment.

Kenneth Craig was the fourth of the inner circle of Breder's staff. He was the youngest of them all, barely twenty-one, when he joined up. And he at once proved to be the most popular, even among diverse nationals, to whom an American had always been something of a term of contempt for weaklings, who still believed in the will of the people and other empty, mouth-filling phrases.

Kai-long, older than he, and miles apart in temperament and racial outlook, became his closest, most-devoted friend.

Gregori smiled his slow smile whenever he passed. The workmen adored him. Only Nijo held aloof, as he did from every one else, going his solitary way, doing his work with high competence, yet spending all his spare time in the privacy of his own quarters.

Old Breder was a gruff taskmaster to this eager young engineer with the infectious grin and candid eyes. But, underneath, human affection for the first time invaded his grizzled frame. He sensed at once that here was a youngster with a mind as keen as his own, a grasp of engineering principles that was little short of astounding, and tremendous capacities for leadership. He set to work at once to groom him for the inevitable day.

THE DAY had come. Adam Breder announced that Kenneth Craig, now twenty-seven years old, was his successor, the man to complete the job that had slipped out of his aged hands. The North-European dictator fumed. It should have been Gregori, he declared. The South European did not care one way or the other. No man of his was

in line, anyway. But Chu-san almost had a stroke. Nijo had been the logical new chief, and all the plans of the Eastern Empire had been carefully based upon that consideration. Now they would have to be changed.

He vented his almost insane wrath by ordering the execution of twenty thousand Chinese chosen at random. The bloodletting, the cries of the tortured, soothed his anguished spirits. Then he set to work again, scheming, redrafting his disarranged plans.

A certain secret code message from Nijo even brought an unpleasant smile to his lips. Perhaps, after all, there might be definite advantages in the unforeseen appointment. The white glare of publicity would not beat upon Nijo or upon the Easterners at Kam.

As for Kai-long, his emotions were divided between unselfish joy for the elevation of his young friend and blazing anger at the unprovoked and hideous slaughter of his beloved people.

"Some day, honored Ken," he told his new chief with clenched, pudgy fists, "I shall revenge my ancient people for all the wrongs they have suffered."

Ken Craig clapped his shoulder with kindly intent. "I know it's damnably hard," he acknowledged, "but there's nothing you can do at present. We have a job ahead of us to finish. After that ——" He stopped short, but his meaning was clear. The completion of the interminable shaft, the raising of Pacifica, superseded everything else. They were engineers first, members of nationalist divisions of the human race second.

Kai-long nodded with somber sadness. "You are right, as always, honored Ken. I shall wait." He moved closer, looked around to see if any one were listening. They were alone in the surface office. "Watch that son of the devil as the vulture watches from the sky for signs of carrion."

"Meaning——?"

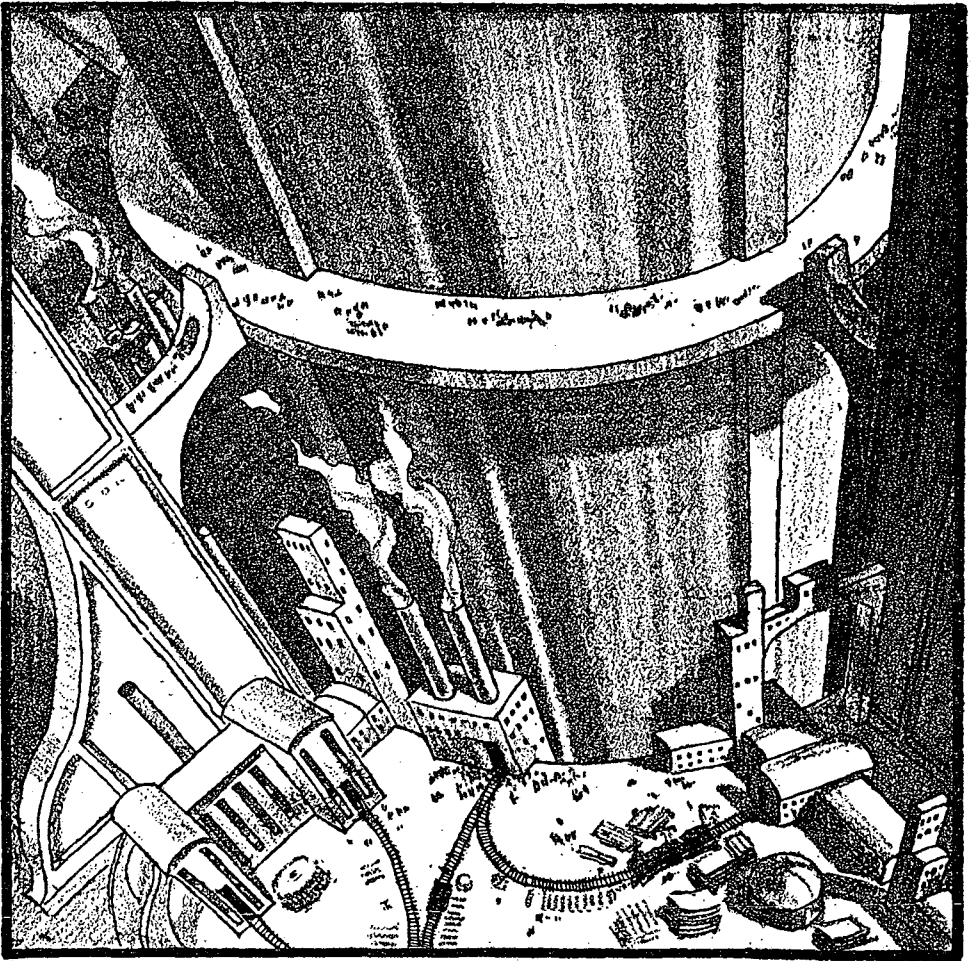
"Nijo!"

Craig laughed. "You're letting your racial antipathies run away with you," he warned. "Nijo's a great engineer. He's the senior here in point of service; there's never been a time when he hasn't done his job well and efficiently. In fact, I wonder why Breder passed him up to put me in charge."

"The venerable Breder did not trust that devil," the Chinese engineer retorted. "Old eyes sharpen as they wait for the sight of their ancestors. That is why he chose you——"

"O. K.!" Craig said hurriedly. He knew what was coming and had no appetite for flowery Oriental praises. "But don't step on his corns. I need him."

Kai-long obeyed with religious fidelity, but he could not suppress the smoldering hatred in his glance whenever Nijo passed. If the Easterner noticed, he made no sign, nor did he seem to resent the fact that a mere youngster had been promoted over him. He performed his allotted tasks with the same quiet competence and efficiency as before. Perhaps, however, he spent



Deeper, ever deeper into the earth it bored, through rock and granite that had never seen the light of day.

more time in his room now, working his hidden light-beam transmitter, and drawing up careful notes.

Had there been any doubt in the minds of the world as to Kenneth Craig's ability to take over, they were soon dissipated. The work took on new energy, new driving force. Problems that seemed insurmountable were overcome almost as soon as they were presented.

Adam Breder stubbornly refused to be removed from the scene of his life work. A private sanatorium was built for him on the ocean shore, where he could rest his waning spirit with glimpses of blue sea and snuff the tropic breezes. Craig visited him respectfully at least once a day, sought his advice with loving care.

IV.

AT LAST, in 2009, the huge shaft passed the sixty-mile limit. The business of the world was practically at a standstill. The nations of the earth waited with bated breath for the expected news. Only in the remote mountain regions of Asia was there activity, and no prying alien eyes were permitted to witness it.

Then, one day, the great news broke. The inner core of nickel-iron had been reached. The drills had broken the earth's sheathing crust of granite and basalt, had penetrated the plastic, unimaginable materials of earth's center.

Had not Craig been prepared and prompt to act, disaster would have overwhelmed the long years of effort. For the liquid-flowing metals, under pressure of almost 400,000 pounds to the square inch, thus suddenly released from the weight of sixty miles of overlaying rock, swept the drill to oblivion, ripped up through the opening with overwhelming force.

But Craig was ready. For a week now the men had worked behind the capping plate, directing the course of the

great drill through televisior screens. As the dark, furious metal seethed up, the hundred-yard thickness of carbostele capping, hardest of all alloys, faced with asbestopor, the perfect heat-resistant and insulator, clamped into place.

The shock of the onslaught was incredible. Millions of tons of heavy metal, fluid under the resistless pressure, leaped in frenzied fury against this puny obstacle to freedom. The thunder of the roaring waves was deafening; the carbostele cap quivered and groaned under the mighty impacts. The workmen crouched with blanched faces behind its flimsy protection. One grimy chap broke into screaming panic for the conveyor elevator that would whip him to the surface.

Craig caught him just in time, whirled him back into the ranks. One move like that and the contagion would spread into a bloody scramble for safety. He shouted bitter commands, but his words were smothered under the smashing thunder of sound. But the sight of him, grim, alert, by the conveyor, Kai-long and Gregori ranged alongside, guns glittering in their hands, spoke with far greater emphasis than any words.

White-faced, shaking, the men returned to their posts. Craig, now that the human crisis was over, hurried to his instruments where the titanic battle was recorded in electrical language. With grim, tight mouth and haggard eyes he watched. Would everything hold? Would the theoretic limits of safety include the actual? Matters that only the next few minutes could tell definitely.

If the answer was negative—— He grinned wryly to himself at that. For only a split second would the knowledge be his. There would ensue such an eruption as the world had never seen since the days when Dinosauria and Brontosauri roamed the steamy swamps. An eruption that would blow the land of Kam and all its works off the

of the earth, that would spurt fluid nickel-iron for miles into the air and rain destruction on hundreds of thousands of square miles of land and ocean.

The instruments jerked and danced with macaber movements. The needles strained to the limits of observation. Strains and stresses and forces registered that the human eye had never before observed in any laboratory. The din was almost unendurable. Then, slowly, as the puny mortals watched their handiwork, the needles began to drop back. Back, ever back, until they quivered to quiescent zeros.

THEN, and then only, did Craig think to take breath. Cheer after cheer, frenzied with release from the shadow of death, broke from the lips of the workmen. Kai-long shook hands in Occidental fashion, but with the solemnity and dignity of his own race. Gregori squeezed his hand in a bear grip that almost crushed his bones. They had won the first great battle, the first test of their work.

Craig said "Thanks!" simply in the sudden hush. Without another word he pressed the visor-screen control. Old Adam Breder's face flashed before him, startled. "What is it, son?" he wheezed. He was old now, terribly old.

"We've reached the core, sir," Craig reported quietly, "and the cap held. The credit is all yours, sir, from beginning to end."

The aged engineer tottered upright on the screen. A glory transfigured his withered features; his shoulders snapped back, youth seemed to flow back into his veins.

"It works," he cried out in strong, firm tones. "I knew it would work. The rest will work too. Pacifica!" he shouted, "the land of Adam Breder, the land——"

He caught at his throat suddenly, wavered, pitched forward on his face. He lay quite still, a seared and empty

husk from which a once indomitable spirit had fled. His work was done.

For a week the island of Kam mourned their lost chief. The nations of the world converged to do him honor. There was a surfeit of glittering uniforms and long, tedious speeches, then the great engineer was buried on the shore of the island to which he had dedicated a quarter of a century, at the meeting place of sea and land. He had wished it so.

Work began again, as needs it must. Time was pressing. The specter of starvation stalked the swarming multitudes of humanity. Deficiency diseases took their toll for the first time in years. Only the successful emergence of Pacifica could solve the problem.

Craig threw himself heart and soul into the task. The course of the underlying fault was carefully mapped. It fulfilled expectations in every respect. A vast layer of nickel-iron had thrust itself upward into the very heart of the basalt region and had somehow been pocketed off from the deep, true core. It extended under the bed of the Pacific for a million square miles, roughly approximating the archipelago of scattered islands that stretched from Hawaii southeasterly to Papua and due east to the coast of Asia.

It was this area which held a considerable number of still active volcanoes and was subject to periodic earthquakes. This was understandable now. The nickel-iron substratum, closer here to the surface than anywhere else, had created a condition of great instability, of constant shifting of the crust in vain attempts to rebalance the load.

Craig drove a series of radiating tunnels from the main shaft to pierce the plastic core at different and widespread points. In each a cap of carbosteale was firmly set. Powerful engines, originally designed by Breder and refined upon by Craig, were laboriously lowered from the surface and installed.

Centered within each carbostele plug was a plunger, extending down the longitudinal axis, its hundred-foot diameter at right angles to the pressure of the metal ocean within the orifice of the tunnel. The engines were connected with the plungers. They were, to all intents and purposes, mighty hydraulic presses of a size and compressive power not hitherto employed.

FINALLY, the great day arrived. The last bit of machinery had been installed, the last anxious test had been made. The world seethed with excitement. Delegations from every nation on earth arrived with pomp and ceremony. The island was divided into sections; each delegation kept to itself, eyed the others with mutual distrust. The international police force staked out neutral zones, exerted itself to avoid all possibility of a clash.

The sea was cleared of all ships, of all submersibles. Even rocket planes were forbidden the air over the designated reaches of the new continent. It was not known just what the ultimate effects of the experiment might be.

As for the islands that dotted the expanse, they were evacuated of all inhabitants, of all valuable possessions. Temporarily they were crowded into continental quarters already overcrowded. The coasts of America, of Asia and of Australia awaited the dénouement with increasing anxiety.

Craig had calculated the displacement of waters by the uplift of Pacifica to be approximately 500,000 cubic miles. This vast amount would ordinarily lift the general level of earth's intercommunicating oceans more than 18 feet. But this, while leaving most of the coast lines unaffected, would play havoc with such low-lying regions as the Chinese water front, the tidewater regions of Eastern America, the mouths of the Nile and the Amazon.

But Craig was quite confident that

there would not be any such rise. For inevitably, in such a vast upheaval, fissures would necessarily appear within the newborn continent, and the excess waters, or sufficient of them to reduce the total displacement to manageable proportions, would cascade into the bowels of the earth to fill the hollows caused by the rising crust. Perforce they must, to achieve proper isostatic equilibrium, for doubtless the pocket of nickel-iron, pressing with renewed force against the confining underlying layer of basalt, would pierce through to seek the inner core from which it had so long been divorced.

Nevertheless, he was grim and taut on that last day. He hardly heard the speeches; the formal ceremonials of the occasion passed over unheeded. There were so many factors involved, so many things that might miscarry. The failure of any one of them, the slightest misstep, and irremediable disaster would pour forth upon a stricken world, instead of the blessings that were so confidently expected.

Kai-long saw the fine lines of worry that lined his chief's face and squeezed his hand affectionately. "Do not fear, honored Ken," he murmured. "Everything is on the knees of our potent ancestors. They will not permit us to fail. The revered Adam Breder is at one with them, controlling the fates in our behalf. Why should our humble selves then doubt the result?"

Craig grinned in spite of himself. Kai-long was a man of science, an engineer among the best, yet in times of crises he reverted to the ways and traditions of his race, seeing no incongruity therein. The greater the crisis the more sincerely and completely he reverted. This then to him must be an extra-special crisis.

"You're right at that," Ken admitted. "We've done all that mortal man can do. The rest is up to our ancestors or fate, or whatever you want to call it."

He glanced at his time signal. "We'd better hurry. It's hardly an hour to noon. It'll take us that long to get down below and make the last-minute adjustments."

V.

AT THE BOTTOM of the tremendous shaft everything was tense, electric. The zero hour was at hand. Soon, too soon, they would know whether or not a quarter of a century of unprecedented effort was wasted and fruitless. Mingled with these sentiments, intertwined with a clouded vision of the social and political implications to the world in general of success or failure, were more immediate anxieties.

No one of the little band of engineers clustered at the switches that controlled the radiating battery of gigantic plungers had any illusions about the precariousness of their position. The forces they were about to unleash, if successful, were of an order more terrible and awe-inspiring than any yet procured by man, or, for that matter, by nature itself in the uncounted eons since the earth had achieved a habitable crust. Forces that partook of a cosmic sweep and convulsiveness.

What might be the result? No one of them could safely predict the answer, not even Kenneth Craig himself. Only Adam Breder had possessed the calm confidence of the wholly impersonal engineer, and he was dead. Earthquakes might rack the world, volcanoes might burst forth through the ocean's heaving bosom with uncontrollable fury. More closely home, the sixty-mile tunnel might prove woefully insufficient under the unimaginable strains.

Everything that human ingenuity, that human genius could do, had been done to buttress its smooth walls, to line it with heat and pressure-resistant materials, but—

The little group looked soberly at one another as the final moment approached.

If anything went wrong, they were trapped, hopelessly, irrevocably, under sixty miles of whelming rock and fluid metal. Yet no one stirred, nor was any panic visible on their countenances.

There were four of them only: Ken Craig; Kai-long; Gregori with his slow, amiable smile; and Nijo, silent and inscrutable as ever. The Easterner, whatever else might be said about him, was not lacking in courage.

Craig checked his time signal, relayed final instructions to the surface, said in matter-of-fact tones: "Very well, gentlemen."

Simultaneously the complicated battery of engines started to turn, great flywheels to spin, electromagnetic fields to push and pull with mighty forces. Simultaneously the great plungers, one hundred yards long and one hundred feet in diameter, strained through the capping carbostele like unleashed beasts of prey.

The banked instruments quivered and moved in sympathetic eagerness. The pressures of the groaning engines built up. One hundred thousand pounds to the square inch, two hundred, three hundred, three fifty! Yet the plungers, shivering from the terrific thrusts, did not move, did not slither even a fraction of an inch within their casings.

Gregori gripped a stanchion with powerful fingers. His placidity was giving way to excitement. "They're not budging," he said.

Craig answered shortly. "Of course not. How can they? There's over 400,000 pounds pressure to be overcome. We'll have to build up beyond that."

Emotion flickered anxiously over Kai-long's slant features. "Do you think the engines can do it, honored Ken?" he queried.

"Without doubt," Craig retorted with a confidence he did not quite feel. Nijo kept silent, as always, but nothing escaped his deep-set, half-veiled eyes.

Three sixty, seventy! The rate of

increase was slowing down. The fields grew mightily, the metal rods spun and gyrated. The whole chamber quivered with powerful, opposed forces. Four hundred thousand, read the pressure dial! A sigh heaved from the waiting men. Another five thousand—ten!

FASCINATED, all eyes turned to the great plungers. They were moving in their machined sockets, slowly, it was true, an inch at a time, but inexorably.

Kai-long called on his ancestors, Gregori whooped, and even Nijo hissed with suddenly released breath. As for Craig, his heart seemed akin to the forcing pistons in the motors. The second step had been conquered!

The hydraulic plungers were moving with accelerated speed now, as the pressure behind them rose to greater and greater heights. Then, suddenly, they were home, ramming the immensely compressed plastic mass beyond with indescribable impact. Almost 360,000 cubic feet of fluid nickel-iron was being forced outward into the vast underlying pocket, already filled to the brim, was beating with simultaneous equal pressures of more than 600,000 pounds to every square inch of the vast totality. Pascal's law was in operation on a scale undreamed of even by its originator!

Craig was surprised to find himself trembling. The atmosphere of the underground chamber was tense, vibrant. Nothing seemed to have happened. The earth did not shake, nor did the smooth-lined walls groan with the titanic pressure. He moved quickly to the controls, reversed the motors. The plungers yielded sullenly as the pressure dropped, giving way unwillingly to the potent enemy they had just bested.

Once again, as the huge cylinders quivered to a position of rest in their casings, the engines took up the positive beat. Once more the plungers rammed home. A cycle had been established. Forward with irresistible thrust into the

plastic nickel-iron, back to position, forward again, systole and diastole, beat and double beat, pounding on earth's interior core with repeated blows.

Yet still nothing happened. The seconds became minutes, the minutes grew. The little group of engineers looked at each other sidewise, afraid to meet their comrade's eyes in the dawning admission of failure. There was not even a tremor to show that earth's too-solid crust was moving under the stupendous lifts.

A tear rolled slowly down Gregori's face, unashamed, unnoticed. Nijo's enigmatic features for the first time showed startlement, alarm even. If Breder, if Craig, had been wrong, then all Chu-san's plans were at an end. But their young chief gritted his teeth, cried harshly: "It must—it must work, if only for Breder's sake."

The engines spun, the plungers moved—in and out, in and out, ten minutes, twenty minutes, half an hour. Yet the banked instruments, carrying the tale of earth's remote crust, did not by so much as the tiniest quiver show the end result.

"There must be an air vent somewhere within the pocket," groaned Gregori, "through which the pressure is released."

"There cannot be, esteemed sir," Kai-long retorted. "Our instruments showed none, nor could such a vent have existed without eruption long since."

Craig, who had stood like a statue, frozen to despair at this seeming failure of all their toil, cried out suddenly. "What a fool I've been! I've forgotten—we've all forgotten—that the waves of propagation of the inducing force through the plastic mass have a definite velocity—about six miles a second. It takes time therefore for the——"

THE television signal buzzed vehemently, insistently. At the same time the dial needles jerked over the face of the instruments. A man's face ma-

terialized on the shiny surface of the screen. His features were contorted with excitement, with alarm. It was Jenkins, assistant in charge on the surface of the island.

"Mr. Craig! Mr. Craig!"

"What's the matter?"

"Kam is rocking on its foundations. The ocean is boiling like a seething cauldron. All hell is popping loose. The men are scared; they say the world is coming to an end. We'll all be killed. Look!"

The man thrust his head back over his shoulder, wheeled with gaping mouth and final scream. Then he lunged backward and out of the range of the televisor.

Even as he ran, the sound of the tumult pierced the miles of solid rock, crashed with a rumbling, frightful sound in the confined walls of the underground chamber.

The earth shook and slanted dizzily. The walls heaved and convulsed with unleashed forces. The engines swayed in their moorings, snorted, and spun irregularly. The din of a tortured, upheaving world deafened their ears, smashed through their consciousnesses in a red haze of rending fury.

Craig staggered, caught at the solid stanchion of the televisor for support in a world where all things were in convulsion. His bleared eyes held dizzily to the still-functioning scene above. There was no sign of Jenkins, of any one else.

But within the narrow range of the screen the world was crashing. Great chasms yawned where equipment-covered slopes had been, the ground moved and writhed like a long, sinuous snake. The Pacific belied its name with unbelievable fury. There was no sky, no sea any more. All things were blotted out in a crashing chaos of gray, spume-crested mountains that flung up to the very heavens, dissolved with breath-

taking velocity, and piled up again in hideous uproar.

Even as Craig watched in confused, bewildered paralysis, planes leaped like long silver dragon flies into the visor screen, red blasting rockets lashing out behind. They bucked and swirled in cyclonic air thrusts, steadied, and streaked across the screen and beyond with reckless acceleration.

It took the staggering American but a moment to realize what had happened. The workers of the island, the diplomatic observers of the nations, the staff he had left in the main power houses, had fled, had deserted him and his comrades, miles beneath the surface, to the elemental fury of the earth jinni they had rashly invoked. There was no one on the island of Kam to direct the thrusting machinery, to confine and control the mighty lift of a continent!

Ken's brain cleared magically. Disaster loomed momentarily, not only to themselves, but to a cowering earth. Even as he sprang forward the screen streaked violently, went blank. Somewhere along the line there had been a break.

Kai-long was at his side, screaming above the uproar. "Turn off the power, honored Ken, before it is too late. Turn off——"

But Craig shook his head in swift denial. His hand was already on the swaying conveyor. "We can't give up now," he shouted. "The process must go on. The motors are automatic; they don't need us. The surface does. Besides, if the power stops, we're doomed, trapped. Come on."

He swung into the elevator, gestured frantically to the others. Gregori and Kai-long crowded in beside him. But Nijo made no move. In this crisis, this elemental crash of earth and sea and rock, no fleeting emotion betrayed his inner thoughts.

"Hurry!" Craig cried again. "We have no time to lose."

But Nijo answered softly, and somehow his voice pierced the rending noise. "Some one must stay below, Kenneth Craig. As you have justly said, the process must go on. There is no returning from the path. But the engines may falter in their appointed task. A human hand must direct, a human mind must oversee. I am only an inconspicuous being. My life does not matter. I shall remain. *You* are needed on the surface."

"Nonsense," Craig shouted angrily. "If any one stays, it is my place."

Nijo stepped swiftly forward. His brown hand darted out, flicked at the button. The conveyor jerked upward before Craig could move to stop it. It seemed to him as he fell backward at the swift acceleration that there was a faint, self-satisfied grin on the Easterner's face. Then it blotted from view.

"He is a brave, devoted man," he said reproachfully to Kai-long as the conveyor shot swiftly upward, swaying and bumping with the vibrations of the inclosing walls.

But the Chinaman was unconvinced. "I do not know," he muttered to himself. "There is something strange——"

Beneath, Nijo smiled triumphantly. He glanced sharply at the instrument board, at the still-heaving plungers. Everything seemed in order. Then he proceeded to do certain things, methodically, purposefully, as if in accordance with a long-preconceived plan. When he was through, he carefully took out from the capacious pocket of his smock a tiny but powerful transmitter, wired it into the current supply. He spoke very low into the microphone, heedless of the thunder around him——

Far off, high on the Mid-Asian plateau, Chu-san heard and was satisfied. A dozen visor screens sprang into life before him. A dozen uniformed Easterners bowed abjectly from the silvery depths. Swift orders crackled. They bowed again and faded from view.

VI.

CRAIG and his two assistants flung out of the cage into a world of turmoil and confusion. Not a human being had remained on the island; every one had fled in terror from the gigantic cataclysm. It was, in truth, a sight to shake the stoutest heart.

Kam rocked underfoot like the deck of a ship in a hurricane. Earthquake tremors followed each other in quick succession. The top of the ancient volcano was gone, tumbled into the devouring sea.

Fortunately it had smashed down the untenanted side of the island, carrying along with it only some accessory storage houses. Huge fissures yawned in the revealed bedrock, extending downward unplumable distances. A great gale howled overhead, whipping speech from their mouths, forcing them to edge their way along with thrusting shoulders.

The ocean tumbled and heaved like a giant in travail. Huge walls of gray-green water lashed mountain high upon the doomed island, tore away tons of slithering rock. Far out, so far it seemed a mirage, the great Pacific seemed to split and shudder away from the black, protruding back of a tremendous, prehistoric monster.

Craig saw, and seeing, knew the answer. "Pacifica!" he yelled to the howling elements. "The continent is being born!"

Then he was within the comparative shelter of the main power house, panting, slithering. Heedless of his companions, he went swiftly from machine to machine, from instrument to instrument. Luckily, they were anchored on bedrock far beneath, and the building itself was on a rise of ground where the ominous tides had not yet reached.

There were repairs to be made, adjustments of delicate parts jarred out of position by the racking tremors. They set to work at once, taping, securing,

making connections more firm. The power was still intact, the panels showed that the plungers sixty miles below were functioning with unimpaired efficiency. Nijo, alone in the underground, had not let them down.

"Good man!" Craig muttered admiringly, and plugged in the televisior. He had found the break, had repaired it. He would order Nijo to the surface, peremptorily. There was no sense in his taking such frightful chances. But the screen remained blank, in spite of his splicing. With a curse he fought his way back to the tunnel shaft.

He would go down, bring him up by main force, if necessary. But the conveyor had unaccountably gone out of commission also. He could not know that Nijo had deliberately disconnected both, cannily foreseeing some such move on the American's part. It was essential that he remain below.

Kai-long shook his head privately to Gregori. "I do not like this, esteemed sir. I do not trust this Nijo; I do not trust any Easterner. They are all treacherous."

Gregori only stared. It was the Chinaman's bitterness against the oppressors of his race that spoke, of course. In his placid, easy-going way he hinted as much. Kai-long subsided, baffled. He did not dare say anything to Craig. Several times before he had been sharply reprimanded.

IT TOOK almost a week for the Gargantuan task to be completed. Only three men saw it through from beginning to end; were privileged to witness the birth of a new continent; the upheaval of a land that had lain submerged and blind under whelming ocean for eons of time.

It was an awe-inspiring sight. For a week the sea boiled and heaved in the throes of a mighty parturition; for a week the island rocked and groaned, while fierce storms pelted their devoted

heads. But slowly the primordial ooze came up from the depths, shouldering the waters away with dripping slime and the skeletal ribs of an ancient world.

As it rose, Kam lifted too, riding the monstrous plains of this new earth with mountainous crags. It was fortunate that it happened thus. Or else the retreating sea would have long overwhelmed them, or the stench of the steamy, miasmic plains have stifled them with odorous effluvia.

Then, one day, the shuddering ceased, the tumult of the outraged elements died. The sun poured out of a brassy sky once more, sucking greedily with its tropic radiance at the muck beneath. Great, steamy clouds rose endlessly upward, veiling the plains in perpetual shroud, billowing like a shoreless sea against the sloping sides of the two-thousand-foot mountain that had once been the island of Kam.

Craig turned to his exhausted fellows. "It's over," he said with conviction. "Pacifica has achieved stability. We've won!"

As far as the eye could see through the rifts in the perpetual steam there was only land. The stink of the under-ocean ooze was indescribable. But that would not last long. The heat of the sun was drying it out rapidly. Within a few months muck and slime would have changed into a soil of unparalleled fertility, hundreds of feet in depth—a veritable Garden of Eden for the agriculturist.

In his mind's eye Craig could envision this vast territory as the future granary of the world, as the habitation of millions of earth's dispossessed. Breder was dead, but his spirit lived on in this tremendous monument to his genius.

Yet there was no exultation in Craig's voice. For one thing, Nijo was without doubt dead. Not only had all their attempts to communicate with the bottom of the shaft failed, but at the very moment that the convulsions had ceased.

the instruments also recorded the sudden stoppage of the automatic plungers.

Was one the cause or the effect of the other, or was the coincidence accidental? In any event, Nijo was dead, otherwise he would have found the means to repair any ordinary break. The power lines through the shaft still functioned.

Besides, they were cut off from all communication with the outside world. From the very beginning, on their first emergence from the tunnel, they had discovered that the transmitters were dead, the receivers as well.

That was bad enough, but what made the whole affair suddenly sinister was Gregori's discovery that they had been deliberately tampered with, in such fashion that repair with the equipment at hand was impossible.

Kai-long sang his eternal hymn of hate. "The Easterners did that before they fled," he declared vehemently. "They took every plane, so that we couldn't escape. It all ties up, honored friends: Nijo down below; this vandalism up above. Something is brewing."

Craig and Gregori, however, paid no attention to his Cassandra croakings. The fact remained that Nijo was even then quite likely dead, a martyr in the line of duty. And the problem of continued existence was a pressing one. There was not a minute of that long nightmare week when they did not expect immediate death. It was a miracle that, battered and tossed about by titanic cataclysms, they remained alive.

They stared soberly down upon the great, shrouded, prehistoric plains. In each mind were the same unexpressed thoughts: What had happened to the rest of the world? Had the sea, instead of disappearing into yawning fissures to replace the plastic pocket, spilled over on the coastal plains? Had terrific earthquakes shaken the cities of the earth into ruins? More urgent still—

were the rulers of the world even now sending forth rocket cruisers to scout the new-made land, to seek for them on their solitary peak in the midst of still-drying corruption?

THEIR SITUATION was fast becoming desperate. Their food supply had given out. Most of the stores had been washed away or had disappeared forever into the gaping fissures. Water there was none. The springs which had formerly watered the island were irremediably gone, and it would be long before the oozing plains would dry sufficiently to retain the returning rainfall in lakes and streams.

On the eighth day the last precious gill of water was distributed, the last morsel of condensed food gulped down dry. Silently they stared out into the sullen-clouded heavens, peered into the vaporous swamps below. It was like a new planet, untouched by life in any form. Nowhere was there a sign that somewhere else mankind swarmed in great cities, lived and loved and bred and hated. They were alone, more completely cut off from humankind by impassable ooze and the destruction of all means of communication than if, in truth, they had been marooned on some far-distant planet.

Gregori said suddenly, in flat, unemotional tones. "I see rocket planes heading this way."

Craig and Kai-long jerked around, crying simultaneously: "Where?"

The North-European engineer pointed wordlessly. They followed his gesture. Far off to the east the clouds had parted. It was early morning. The newly risen sun poured through the rift his dazzling shafts, slanting in long streamers over primordial swamp.

Across the blare of light, black spots moved swiftly, purposefully—hundreds of them. On they came, hurtling directly for the towering island of Kam, streaming behind them sword flashes of



*Every one had fled—the island rocked—the volcano was gone,
devoured by the sea—*

flame, bringing within their lean bellies men and the civilization of this year of grace, 2010!

Again Gregori spoke. "I knew they'd come," he said simply. Things were uncomplicated like that for his placid faith in humankind.

But Craig frowned and squinted sharply against the molten glare of the sun. Strange that a rescue squadron should run to the hundreds of ships; stranger too that those long, lean lines connoted battle cruisers.

Kai-long rose with bitterness in his slitted eyes, hate in his voice. "Those are the squadrons of Chu-san," he cried. "There is trouble ahead."

They looked again. There was no question about it now. As the great planes grew into form and solidity, they could see the hornetlike stripes of black and yellow that betokened the armament of the Eastern Empire.

Craig shook off his own private doubts almost angrily. "What difference does it make who rescues us?" he demanded. "Chu-san's forces were nearer to us. Naturally they got here first."

Kai-long stared at him quietly. His face had become placid, enigmatic. He too was an Oriental. "It is no use," he said softly. "The minds of the Westerners are like those of young children. They do not understand the tortuous channels of the Easterners' thought." He got up, pulled his loose-fitting coat tightly about him, salaamed with grave solemnity.

"Farewell, oh honored friends," he said. "It is not for my humble self to sully the triumphant approach of the mighty Chu-san."

THEN he was gone, vanished from their sight. One moment he had stood before them, bowing almost to the ground; the next he had disappeared soundlessly behind the ridge the temblors had thrown up.

"Come back, Kai-long," Gregori called

in alarm, lurching forward in pursuit. "You're crazy——"

Craig caught at him, held him firmly. His brow was furrowed with secret doubts. "Let him go, Gregori," he said. "Kai-long is not crazy, nor a fool. You forget he is a fugitive rebel in the eyes of Chu-san. The Easterners would make short shrift of him if they ever caught the poor devil."

Gregori stared, bunched the muscles on his great shoulders. "They'd never dare," he said.

"Dare?" Craig echoed with an uneasy laugh. "Who could stop them? You forget, Gregori, might, in this year of civilization, 2010, makes right." He shaded his eyes at the fleet. Already they could hear the roaring blasts of the rocket tubes. "And just at this present moment," he added, "Chu-san has all the might."

The battle cruisers cradled to the sloping terrain in cushioning jets of fire. Exit ports slid open, and slant-eyed men of the East poured out in disciplined formation.

Craig moved forward to meet the black-and-gold bedizened commander. For himself and Gregori he had no fear, but he was worried about Kai-long. Sooner or later——

He extended his hand. "I am glad you came," he said heartily. "Our provisions are completely exhausted."

The Easterner ignored the proffered hand. He barked out orders in the sing-song syllables of his race. Soldiers scattered obediently—some to the mouth of the great tunnel, others to the various buildings that were still intact, while a group with suddenly showing dynol pistols filed ostentatiously to either side of the two engineers.

Craig's eyes narrowed. "What's the meaning of this?" he demanded.

For the first time the commander permitted himself a grin. "It means, oh barbarians," he declared brutally, "that you are both under arrest and subject

to the blessed will of his august presence, the Emperor of the East, soon to be lord of all the world."

Some one near Craig growled like a wounded bear. He spun around to see Gregori, blue eyes flaming, great hands outspread, jerking forward. His arm shot out, clamped on the lunging man with a grip of steel. Just in time, for the dynol pistols were centered on the North-European engineer, ready to fire.

"You fool!" he whispered sharply. "Don't you see they're aching for a chance to wipe us out. You're furnishing them with the best excuse."

Still growling, Gregori pulled back, while Craig faced the commander with steady eyes. "You can't get away with this," he declared. "It means war with the British-American Union, with North Europe, with the rest of the world. Your master is biting off more than he can chew."

THE EASTERNER spat contemptuously. "Bah! You are fools, unfit to wash the feet of our race. All these years you toiled and labored—for us. Did you really think we'd permit this new and mighty land you have so kindly raised from mother ocean to be turned over to others? Idiots, imbeciles! We hugged ourselves in secret and laughed at your childish faith in treaties. When Nijo gave the word, we came."

Craig nodded quietly. "I thought as much. That was why he planned it so he could remain below. He used a beam transmitter to communicate with you."

Kai-long had been right, and he wrong. He told himself that without rancor, without bitterness.

"But still it does not matter," he went on. "You've seized Kam temporarily. It won't be for long. Within days, or weeks at the most, the other nations will send exploring expeditions. You will surprise and destroy the first, but later overwhelming armadas will proceed

against you. You cannot defeat the combined resources of the world."

The commander smiled subtly. He did not seem at all alarmed at the American's dire prognosis. Then their attention was distracted by a commotion at the entrance to the shaft. Soldiers were prostrating themselves flat on their faces before the plain-smocked figure of Nijo.

The Eastern engineer ignored their genuflections, came toward the group around Craig. His saturnine features were immobile, his eyes veiled, as always, as they rested on his former comrades. Gregori ripped out an oath, but Craig said nothing. There was nothing to be gained by losing his temper now.

The commander of the air fleet fawned on the newcomer. "Welcome, most illustrious one," he greeted Nijo effusively. "Our master is most pleased with your efforts; he has been so gracious as to direct me so to inform you. I hasten to lay our humble lives at your feet to trample on and do with as you will. The master so commands."

Nijo disregarded the protestations. His black eyes fixed somberly on the commander. "You have failed in your duty, Ala Beg," he said coldly. "Your fleet was due yesterday, even as I had ordered. Had these barbarians not been utter fools, they would have suspected us before this. By wrecking the power house, our carefully laid plans must have failed. It was not your fault that did not happen."

The commander's features went dirty-gray. "There were storms and blasts of steam from the seething land," he explained trembling. "It would have been certain death to venture from our hidden ports before this."

"Death?" echoed Nijo contemptuously. "You, a mere weapon in the hands of the mighty one, speak of death as an excuse! Beware lest the master make you implore death to come and

release you from your unworthy life."

Craig stepped forward, fists clenched, eyes bitter-slitted. "You, Nijo," he blazed with fierce scorn, "have planned this from that first day, twenty-five years ago, when you joined Breder at the behest of your scheming dictator. All these years you concocted this treachery in the distilled venom of your mind. This work, that was to us a sacrament and a consecration, that was to be the salvation of a world in distress, the harbinger of a newer and more glorious day, was to your slimy Eastern mind merely a way of aggrandizement for your vile ambitions."

NIJO STIFFENED. For a moment lightning leaped in his inscrutable eyes. The commander pressed forward eagerly. "Let me kill the dog for his sacrilegious language," he begged. Anything to ward off the wrath that had been expended on himself.

But Nijo waved him aside. The flames had died; once more he was his usual cold, contained self. "Take heed how you speak, Kenneth Craig," he said without heat. "I hold no hate for yourself; nor for that North-European oaf who was your assistant. Your lives are in my hands; I besought that much from the mighty one and he deigned to grant them to me. Take heed lest you throw them away unwittingly. You are engineers—good ones. So am I. But my duty to my race far outweighs the petty considerations you speak of so rashly. Take them away, secure them properly, but do not mistreat them," he ordered.

Soldiers sprang to their sides, seized their arms. Craig did not attempt resistance. It would have been suicidal. But one parting shot was to be his. "Kai-long was right all along. He said ——" The American stopped quickly, and bit his tongue. But it was too late. The damage had been done.

For once Nijo was shaken out of his immemorial calm. His sullen features

writhed with hatred. "Kai-long!" he cried. "That offspring of a pig, that rebellious slave! Quickly," he snapped to the commander, "where is he?"

The man looked bewildered, spread his hands placatingly. "I do not know, illustrious Nijo. There were no other dogs of foreigners here but these two."

The Eastern engineer wheeled on his prisoners. "Where is he?" he threatened. "Speak with quick, truthful tongues or it will be the worse for you."

Craig kicked Gregori's foot in surreptitious warning. "Poor Kai-long!" he said sadly. "He was drowned and washed to sea the very first day we emerged. A great tidal wave broke over us."

Nijo surveyed him sharply. Craig's features were screwed up in seeming sorrow. Gregori's face was a placid blank. The Easterner was only half satisfied with his scrutiny. "If you are lying——" he stared, and left the threat hanging unfinished. "Search the mountain," he rasped to the soldiers. "Search every nook and cranny. Your heads will fall if he is alive and you do not find him. As for these, away with them. I have other and more-important work to do."

VII.

A WEEK PASSED—a week of agonized expectation each day of the firing squad, of anxiety for Kai-long, of wonderment as to the outer world. They were not brutally treated, but day and night heavy chains weighed them down in the small chamber underneath the power house where they were confined. A huge, surly Easterner was always on guard, fingering his dynol pistol with significant gestures.

They dared not ask directly about Kai-long. In the face of repeated questionings they had stuck stoutly to Craig's original story. The fact remained that he had not been found. But, Craig realized with a sinking heart,

that might only mean that he had deliberately committed suicide rather than fall into the hands of his enemies. It was impossible to evade a well-organized search in such narrow limits.

Outside, the mountainside seemed a hive of activity. Day and night the sound of rocket blasts ripped through the prisoning walls; night and day the ground resounded with the tramp of marching men. But the guard refused to be drawn into conversation, into enlightening them as to what was taking place.

For the first few days they kept up their spirits. It was inconceivable that the nations of the earth, especially the British-American Union, would take such an outrageous usurpation supinely. It was just as inconceivable that Chu-san could long withstand the combined forces of an aroused world.

Then, at the end of the week, they heard the shrill signal of an alarm. Hoarse shouts followed, muffled commands; even as they strained in an agony of impatience, there came detonations that could only be the crash of petrolite bombs. Through the thunder of the greater weapons were to be heard the vicious crackling of the tiny but deadly Dongan throwers.

Craig relaxed with grim satisfaction. "They've come at last," he said to the blond giant who sat next to him, hands and legs manacled. "I knew they would. It'll be over soon."

The guard overheard and grinned surlily. He did not seem to be at all disturbed by the sounds of battle. "Barbarian imbeciles!" he said disdainfully. "They would not believe, and they came. Wait until it happens."

"What happens?" Craig flung at him. But there was no answer. The guard had his head cocked to one side, as if he were listening.

The boom of great guns, the crash of bombs, seemed to increase in intensity.

The building shook with mighty concussions. Then there was another sound—not as thunderous as the noise of battle, but more of a rumble and mutter of the ground itself. The walls swayed slightly; the floor pitched at an angle.

"There it is," exclaimed the guard. "Illustrious Nijo!" Unable to contain his delight, the Easterner rushed out of the prison chamber to see for himself the event that had been so confidently anticipated.

Craig and Gregori stared at each other in astonishment. The rumblings continued, comparatively mild and harmless sounding. But nothing else happened that was startling. The terrific conflict between the opposing rocket forces beyond the mountain went on with unrelenting vigor. There was no slightest pause in the hurtling rain of death. What could it all mean?

The North-European engineer shook his head disgustedly. "That fellow must have gone crazy."

BUT CRAIG was still listening intently to those rumbling undercurrents that sounded so innocuous against the greater uproar of man's weapons. Suddenly he uttered an ejaculation of horror.

"What's the matter?" Gregori asked anxiously.

"I've got the answer," the American said. "It's a fiendish, damnable plot. Only Chu-san and Nijo could have thought of it."

The blond engineer stared at him in bewilderment. "But what do you mean?" he queried. To him the steady rumblings brought no enlightenment.

Craig explained. "We figured originally that the pressure we brought to bear on the upthrust of nickel-iron would not only lift Pacifica out of the sea, but would eventually break through the confining layer of basalt that

separated it from the great central plastic mass. We anticipated that, I say, but as we expected to cease operations as soon as the continent was raised, we saw no harm that could come by it. As a matter of fact, none of us, including Breder, worked the thing out to its logical conclusions. It was not necessary. But Nijo did."

"I still don't get the idea," Gregori muttered.

Craig listened to the unabated clamor outside with a sort of despair. Only too soon it would stop. Just as soon as frantic chancellories of the far corners of the earth could get to the televisors to call off their squadrons.

"It's this way," he said dully. "The nickel-iron pocket we used as a medium for Pascal's law is no more. It is now but a continuity of the vast plastic core of earth's interior. But the laws under which we operated have not changed. Only the field of operations has been immeasurably enlarged. Don't you see?"

"By forcing our plungers into the same pocket as before, the transmitted pressure is no longer circumscribed to the area of Pacifica. It traverses the entire central core of earth's fluid compression; it is transmitted undiminished to heave with mighty pressure against every square inch of the entire overlying crust of earth!"

"The entire globe must be rocking now with terrific earthquakes, spouting volcanoes, straining up into unresistant space under the forcing pressure."

Gregori fell back in his chains, gasping. "Good Lord!" he cried.

"Yes," Craig went on in despair. "Nijo has done just that. He has converted all earth into a gigantic hydraulic press; he is willing to blow the entire crust of the planet to smithereens to satisfy his master's insatiable greed for power. Rule or ruin! This was the ace they had in the hole; this was the reason

they were not afraid of the superior forces of their enemies."

"But the nations have attacked," Gregori insisted.

"Because they did not believe or take seriously Chu-san's threats of what he would do if they dared resist his piratical seizure of Pacifica. He is showing them now."

"I don't believe it," Gregori declared. "It's too insane. Chu-san's own dominion would smash as well as the others."

Craig shook his head. "It has been recently established that the most stable expanse of the earth's crust is the great mid-Asian plateau that is the heart of the Eastern Empire. There will be tremors, even as there are on Pacifica; but they will be slight and comparatively harmless. The full brunt will be borne elsewhere, along the Western coast of the Americas, in the Mediterranean basin, in the Crimean-Caspian region."

"You forget the coastal rim of Asia. That belongs to Chu-san," Gregori pointed out in triumph.

"I didn't forget; neither did Chu-san," Craig answered soberly. "It is true there is no more unstable region on earth; that his scheme will bring untold destruction to the luckless inhabitants. But they are subject races, not the people of the arrogant conquerors who swept over them from the interior. As a matter of fact, Chu-san would welcome the decimation of his slaves. They swarm too greatly; they are the foci of continual rebellions. But listen!"

He broke off short. The great concussions of sound ceased abruptly. Only the constant, slight tremors remained. After the ear-splitting clamor it sounded like deathly stillness. Then shouts arose, high-pitched Eastern voices clamoring their strange paean of victory.

"You see," Craig said, turning to his companion quietly, "it is all over."

Gregori heaved at his chains. His

good-natured face was red with wrath. "I'll break their necks," he said viciously. Then he subsided, just in time.

THE GUARD was back, coming in with a rush of heavy shod feet. His grin was gleeful, his voice cackling. Gone was his former reticence. It was too good to withhold. "Ho! Ho!" He leaned against the wall, wiping the tears of laughter from his eyes. "You should have seen them turn like whipped curs and flee. Their masters at home were scared. You should have heard their radio messages. They gave in on all our demands—everything, so long as Nijo stopped the earthquakes."

Laughter choked him. "It must have been great sport," he rushed on, heedless of the mounting horror of his prisoners. "I hear that San Francisco and Los Angeles are a mile under the sea; that Italy no longer exists; that millions of barbarians have died. Ho! Ho! Ho!"

He doubled over, holding his sides in a very ecstasy of merriment at the humor of the situation. Anger surged over Craig at the utter brutality of the man. Lord, if only he could be free of his chains for just five minutes! Gregori was making strangled sounds in his throat.

Craig relaxed suddenly. A figure had come soundlessly through the open door, was creeping toward the still-chuckling, unknowing guard. It was with difficulty that he held back the hoarse cry that leaped to his lips. It was Kai-long!

Kai-long who had been dead, come back for vengeance! His former rotund figure was gaunt and wasted now. His clothes were in shreds; blood and slime in equal proportions made of him a dripping scarecrow. But his lean hand held a rusted knife.

Gregori lifted his eyes, saw the silent, terrible shadow. He uttered a cry of surprise. The guard whirled,

but even as he swung around, hand clawing for his dynol pistol, Kai-long had leaped. There was a dull, gurgling sound, a stifled half sob, and the guard sagged to the ground, a limp, huddled mass.

Kai-long's grimy hand went to his lips in a swift gesture of silence. Then he was down beside the unmoving guard, searching his pockets. Out came a bunch of keys, a dynol pistol that the Chinese engineer hefted lovingly. In seconds the two prisoners were free, stamping cautiously to bring back circulation into their long-cramped limbs.

"But where have you been all this time?" Craig asked over and over. "We thought you were dead."

Kai-long lifted his eyes. "I should have been," he answered grimly. "Only the thought of you, of my hate for the Easterners, kept me going. I hid out in the slime and muck of Pacifica, where no one dreamed of looking for me.

"Up to my neck day after day in foul, rotten filth, holding my head desperately up to keep from going under; crawling out painfully at night to steal some food; going back at daybreak." He shivered. It must have been an indescribable experience. "But come, we have no time to lose. The alarm will be given shortly."

"Where to?" Gregori demanded. "They'll find us wherever we go."

Kai-long did not answer. Instead he reached into the ooze of his tattered pocket and took out a tiny metal ball, not over two inches in diameter.

"A petrolite bomb!" Craig exclaimed.

For the first time the Chinese engineer smiled. "Exactly, honored Ken. I stole it from an ammunition dump one night. I thought it might be handy. Now do you know my plan?"

Craig was already at the door. His eyes burned. "Do I know it?" he almost whooped. "I'm practically there already. We're going to the tunnel shaft."

"Oh!" Gregori grunted once, and followed without hesitation. The plan was absurdly simple. Petrolite exploded on direct impact. The force of its suddenly released energy was terrific. It was the mightiest explosive known to science. Within that tiny sphere was enough petrolite to rip through a hundred yards of solid rock.

But the operation of the plan was another matter. Three shadows emerged cautiously from the building into the open, flattened against the wall. One held a pistol, another a knife; the third had nothing but his bare fists. For a moment they hesitated.

VIII.

FORTUNATELY it was late afternoon. A crepuscular twilight, deepened by the still writhing vapors that emanated from the oozing plains beneath, made of the mountain a thing of somber shadows. Then, too, all discipline had gone in the wild delight of the Easterners at their ghastly victory. Already half were sodden drunk, the other half dancing and whooping and shooting star shells over Pacifica.

"Keep close together," whispered Craig. Crouching, they moved stealthily over the jagged terrain. Several times they threw themselves flat on the ground while parties of drunken Easterners staggered by. Then they rose and made their cautious way once more.

Night deepened. And still the cohorts of Chu-san kept up their wild celebration. There was no further need for precautions for the usual stated rounds of sentinels. Hadn't the entire world acknowledged, with fear and trembling, the overlordship of the East?

So it was that the three grim men had no real difficulty in reaching the mouth of the huge shaft unobserved. Two Easterners, ostensibly on guard, were all eyes for the moving lights and blazing star shells below, and grumbling

mightily to each other as to their wretched fate in being stuck on post.

"What say you," queried one of the others, "that we sneak away to join our companions in their revels? No one would ever be the wiser."

His companion shook his head negatively. "The illustrious Nijo rendered us peremptory orders. Even now he is below, operating the machinery of the dragon-devil. Should he wish for speech with us in the televisor, and we be gone, our heads would roll in the smelly waters of Pacifica on the instant."

Three dim shadows rose silently behind the discontented pair. A knife described a vicious arc; a gun barrel descended with crushing force. The way to the tunnel was clear.

For a moment they stared down into its darkling, unfathomable depths. Craig gulped to withhold the strange emotion that clogged his throat. This was the mighty monument of his life, of old Adam Breder before him. Yet it must be destroyed. The peace of the world, the happiness and welfare of billions of oppressed mankind, demanded it.

He knew well enough that they must die in the ensuing cataclysm. There was no manner of escape. Yet he did not flinch, did not by so much as an untoward word betray his feelings. He stared sideways at Gregori.

The blond engineer had his head thrust back, searching the heavens with an intensity Craig had never noticed in him before. He knew too the end result, was taking his last look at the stars. The race of man is not all bad, thought Craig. There are those who still aspire to the stars, who still can sacrifice themselves without a murmur for a righteous cause.

He shook himself back to reality. There was work to be done, and time was pressing. "Kai-long!" he whispered.

THE CHINAMAN started. He had been absorbed in praying to his ancestors. Soon they would receive him in their timeless arms. Without a word he clutched at the little bomb, heaved back his arm to throw it into the huge orifice. ~

Craig hurled forward with an exclamation, caught his arm in midflight. "For God's sake, man, what are you doing?" he rasped.

Kai-long stared at him bewildered. "Weren't we going to blow up the shaft?"

"Of course," Craig answered. "But don't you realize that just dropping the bomb down will never do it? It's sixty miles. The slightest angle of thrust as it falls, the tiniest current of air in the shaft, the very gravitational pull of the walls, will have deflected it long before it reaches the bottom. Somewhere along the way the bomb will crash into the sides and explode. Damage will be done, but nothing that cannot be repaired. *That* isn't the plan."

"Then how can we turn the trick?" Gregori asked.

"The conveyor elevator," Craig said promptly. "Here, give me the bomb." He took it from Kai-long's unresisting fingers, ran quickly to the quiescent, stream-lined shell. The porte was opened. Very gingerly he placed the deadly sphere on the metal floor of the conveyor, slid the door tight shut. Then he ran to the electromagnets that held the huge elevator clamped against the magnetized rails along which it slid down the shaft.

Even as his fingers reached for the controls, the visor screen, directly over the panel board, glowed into being. The squat body and saturnine features of Nijo limned on the shining surface.

"Send down the conveyor, Kazak," he ordered. "My work is finished. It is time——" He broke off with an exclamation of alarm as his eyes lifted to

stare out of the screen at Craig. "You can't——!"

"No one else, Nijo," the American retorted savagely. "Here is the conveyor and be damned to all eternity!"

As he reversed the magnets, he saw Nijo's brown hand reach out for the subterranean alarm signal. He laughed exultantly, ripped open the master switch that controlled all the power in the tunnel.

The visor screen went dead; the housing that inclosed the mouth of the shaft plunged into darkness. The conveyor was falling now, falling freely with the constantly accelerating force of gravity, bearing terrific destruction within its womb. The magnets were dead too. There was no break on its tremendous journey, nothing that could be done at the bottom to avoid the ultimate crash. Only the residual magnetism in the rails held the grooved runners to themselves, guided the elevator smoothly down the side.

"That's that," Craig remarked casually. "In some three minutes, allowing for the friction of the rails, it will crash into the underground chamber and the carbosteale caps."

He did not have to add that their term of life was now limited to that three minutes. He knew exactly what would happen when the petrolite exploded. In fact, he eagerly awaited it. Nevertheless he took a deep breath. Life had been good, and he was young.

Tense with the expectancy of onrushing death, he did not at once hear the sharp, agonized whispers of Kai-long. Then he was plucked violently by the sleeve. "Come at once, honored Ken. Three minutes is a paltry time. Quickly, follow me!"

ALREADY the Chinaman, like a grotesque scarecrow in his flapping rags, was racing over the side of the mountain. Gregori looked astonished, but followed. He never bothered with un-

necessary questions. Craig stared, losing precious seconds, then raced after the flying figures. It was impossible, of course, to escape. In almost two minutes now hell would break loose. But Kai-long was not given to frantic scurryings without definite purpose.

As he ran he heard the mounting drunken carousings down below, where the ancient shore line had been, saw the glitter of staggering, moving lights. A wry grin twisted at his mouth. In less than two minutes all those arrogant Easterners, with Nijo, trapped alone at the bottom of the shaft, would catapult to oblivion in a shower of unrecognizable blobs of flesh. So would he too for that matter, so would his comrades.

Well, for himself he did not repine. It was worth it. Never again would any human being, or group of beings, be able to control the destinies of the world by threat of earthquakes and cracking upheavals. Perhaps, with the horrible lesson they had just learned, mankind might come to its senses, cast off the greedy, insatiable rulers who had brought it to the brink of destruction, and rise to the heights of which it was capable.

Up ahead, in the darkness, he heard muted shouts. "Craig! Kenneth Craig! Where are you?" Feet pounded backward, bearing the crier. Gregori loomed in the starshine, panting. "Hurry!" he gasped. "We thought we had lost you."

Barely a minute to go before the elevator smashed with frightful velocity at the bottom of the tunnel!

A long, sloping hulk loomed ahead, dim against the sheltering hill. Hope hammered again in Craig's bosom. A rocket ship! A small, swift passenger ship for personal use. It was evidently Nijo's. His work was finished; he had intended departing for the capital of his master to report and receive his well-earned reward.

Less than a minute now! They fairly

flew over the uneven ground. Kai-long's grimed and wasted face peered anxiously from the entrance porte; his frantic gestures urged them on. It was dark within; he had not dared switch on the lights. Fortunately the ship was deserted. The crew had tumbled out to join the jubilee below.

Only a half minute to go as they tumbled through the porte, sent the shield whizzing into place. Craig catapulted to the controls, Gregori to the rocket blasts, Kai-long to the lights. It did not matter now if they were discovered. They must be able to see. The interior blazed with illumination, bringing each instrument sharply into being.

Through the sound detectors came a sudden fierce clamor. The Easterners had seen, and understood. Already those who were not too intoxicated to stand, were wobbling up the hill after them. That did not matter. But less than ten seconds remained. No time to take off carefully, with due regard to acceleration forces. Craig sang out; "Hold on tight!" gritted his teeth, and swung on full power.

There was a full-throated roar as the rockets blasted flaming gases into the ground. The ship sprang straight up into the air like a bullet from a gun. Craig felt his feet driven through the floor, his heart slam with suffocating thumps against his ribs. For a split second consciousness left him—

When he came to, the rocket ship was zigzagging wildly, zipping through space with frightful acceleration. Gregori sprawled on the floor, a cut oozing blood where he had collided with the wall; Kai-long swayed with desperate grip on the straps.

CRAIG reached dizzily for the controls, cut down the power, straightened their course. Even as he did so, the ship rocked suddenly from side to side, leaped forward again in wild flight.

Simultaneously, the world seemed to come to an end in a terrific welter of sound.

Around and around and around spun the tiny craft, caught in a maelstrom of forces that no rudders or rocket jets could control. As they tumbled in insane barrel rolls, Craig, gripping the emergency straps for dear life, caught kaleidoscope glimpses of what had once been the island of Kam.

It was now a spouting, molten furnace that even at this height hurt the eye with its dazzling glare. The top of the ancient volcano had blown off; a fiery, liquid stream thrust outward in gigantic spray. All signs of man, of man's works, of the mountain itself, were obliterated. For a hundred miles around, the vast, sodden plain of Pacifica shrank affrighted from the blazing wrath.

After what seemed hours, Craig was able to straighten out the ship. It was a miracle they were alive. Huge chunks of fiery metal had sailed past them, missing them by inches. Hot, exploding gases had tossed them like dried leaves in a winter storm.

They took deep breaths, these three men who had stared death in the face and remained unscathed. All was silence now, except for the soft rumble of the rocket jets; all was darkness beneath as they winged their swift way over the new continent, eastward toward the Americas.

Gregori shivered. "Petrolite is a powerful explosive," he whispered half to himself.

"Yes," Craig agreed, watching the

visor screen for answers to his repeated calls. "It ripped through a hundred yards of basalt down in that shaft, making a vent for the imprisoned nickel-iron core of earth. The terrific pressure forced the fiery fluid up the tunnel shaft, blazed out in awful eruption."

He paused, went on gravely. "There are no Easterners left on Kam; there is not even Kam any more." He stared again at the visor screen. "In a way I'm sorry for Nijo. He acted according to his peculiar code of loyalty. To him it was the only honorable course."

"I'm not sorry," Kai-long cried fiercely. "The Easterners have tortured my people long enough. Now, once more they will be free—free to live and breathe and be happy. My people!"

"Chu-san is still alive," Gregori said mildly. "And he still has resources."

"Not with the whole world against him," Craig retorted. The screen glowed. The keen, determined features of the President of British-America appeared. There was an anxiety in his glance that gave way at once to incredulity.

"Craig! I thought you were dead!"

"Not yet, sir," the supposed dead man replied cheerfully. "I wish to report Kam destroyed with all its enemy force, Pacifica a mighty continent that will be ready for colonization within a month or two, and our work completed as per schedule." Then, casually, as an afterthought: "And, Mr. President, I would suggest you communicate with Chu-san and acquaint him with the facts. I'm certain he will see the light and require no further persuasion."



Code of the Spaceways

*A tale of far places, of men who are
not afraid, of life on the star trail.*

by Clifton B. Kruse

CAPTAIN CHAPMAN'S full-throated blast reverberated through the phones of the X9: "Mechanic deck. Attention to orders. Cut drivers in deceleration, forty units brake."

"Aye, aye, sir."

"Pilot attention. Arc for landing: Crystal Base, Uranus!"

"Order receiver, sir."

Immediately the huge interplanetary freighter began to throb with quavering moans. There came a steady succession of tingling vibrations as the forward torps fired their staccato blasts which steadily braked the ship's terrific speed. The stench of superheated oil stung the space-hardened throats as the pulsating condensers whined in constant readjustments.

The effect upon the men was that of a tempestuous storm at sea. Weird howls emanated from ponderous mechanisms as the great hull quavered with nauseating vibrations.

Swaying rigidly, his eyes rounded in perplexity, Charter Dubinsky met Captain Jon Chapman's implacable flinty-eyed gaze.

"You think——"

"Listen, Dubinsky," Chapman interrupted sharply, "I know what's eating on you. You're young and too damned conscientious. You're worrying about the X9's cargo. The Earth-Plutonian contract is five years. That's too long and too expensive a trip to take chances with. And you're all upset about this cockeyed warning from Uranus."

"Yes, sir. You're right. There must be something wrong at Crystal Base and——"

"And inasmuch as this is a cargo ship we'd better stick to our flying, that it?" Chapman rubbed at his reddish beard with a coarse, leather-skinned hand. "Listen, Laddie. Our schedule calls for a rest on Uranus. We've been months flying from Neptune to here and there are more months ahead of us before we touch Saturn. Do you know what a year or more of steady blasting through space does to a man?"

"There are a hundred and ten aboard this ship and if we don't get a rest on Uranus there'll be a hundred and ten gibbering lunatics before we drop to Saturn. I know, Dubinsky! I've been shooting the skyways for the council for better than sixty years. We're landing on Uranus if we have to use the guns. Just you stick——"

"Captain Chapman!" a voice blared from the communication receiver. "Plot deck calling. Come at once!"

It was the husky tenseness of the voice which shocked the old officer into action. Without a word he started for the ramp, the younger man at his heels. Coming into the forward control chamber he met the worried glances of the three pilots.

"Look!" Senior Pilot McKernan gestured excitedly toward the telescopic reflector plate. "Crystal Base is in flames!"

Chapman's gaunt frame stiffened in rigid attention as he stared up at the con-

stantly enlarging reflection. The magnificent greenish-blue aura of the great planet, Uranus, completely filled the plate, and at the precise center toward which the nose of the X9 was charging there glowed a peculiar disk of pulsating orange-red flame.

Even as the eyes of the ship's officers held to the fearsome spectacle the rhythmic *click, click, click* of the etherometer measured their speedy approach to what should be the safe and comfortable interplanetary outpost city, Crystal Base.

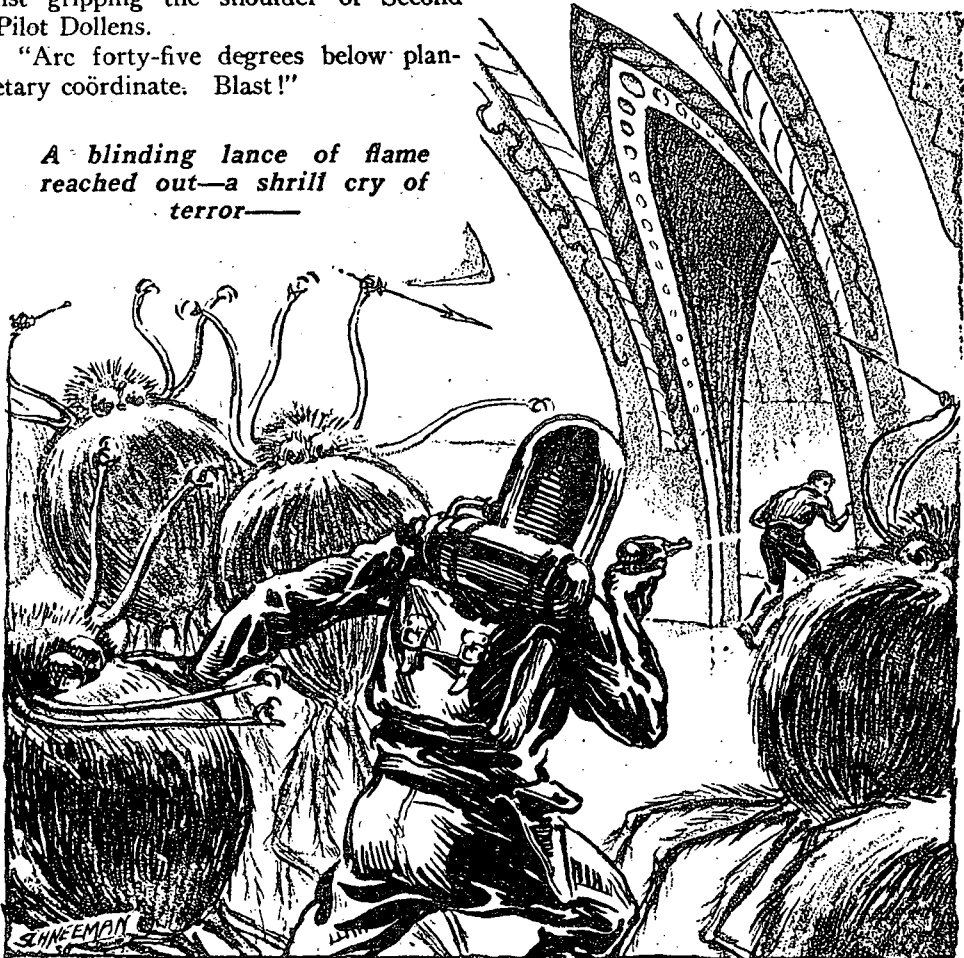
Abruptly, Captain Chapman tore his gaze away from the reflector plate. He was beside the control panel, one huge fist gripping the shoulder of Second Pilot Dollens.

"Arc forty-five degrees below planetary coördinate. Blast!"

*A blinding lance of flame
reached out—a shrill cry of
terror—*

SIBILANT WHINES burst from the gigantic side thrust which sent the massive freighter upon an encircling course. The impact of the sudden change in direction brought all those who had been standing to their knees. The plot deck spun before their eyes. Ears rang. A soft, half-muffled moan escaped the bluish lips of Charter Dublinsky. A trickle of blood ran from his nose.

"Graduate power for drop," the powerful voice of Captain Jon Chapman beat into the force-twisted senses of the pilot. "Angle at three points and hold it."



"Aye, sir," Dollens choked out, his shaking fingers stabbing at the intricate controls.

"Maintain this position until further orders," Chapman continued and then turned about, surveying the other bewildered and nauseated men.

"Colosus!" McKernan bit his lip to maintain his composure. "Such a maneuver with a loaded ship. It's a wonder we didn't crack in two. But great guns, Chapman, what the devil do you suppose has happened down there? I didn't think there was heat enough on the whole planet to burn up an outpost."

Chapman's narrowed eyes became two dots of sparkling flint, and the ruddy, whiskered jaw protruded stubbornly.

"I don't know—yet," he barked. "But we'll find out soon enough. You, Dublinsky, get to the under decks. See to it that the mechanics and blasters hold to their posts. Action orders prevail. But answer no questions. We'll land on Uranus in approximately three hours with this shift. In the meantime we'll try to get in touch with the commandant.

"Ivan Hood is in charge at Crystal Base—or was," McKernan spoke up. "Flashcaps were signed by Lieutenant Zaharius. The last warning we received was cut off in the middle of his signature. Since then their flash marker went dead. Probably burned——"

"That isn't fire," Captain Chapman interrupted sharply. "Look at the telescope plate closely. Except for the reddish glow the appearance of Uranus is unchanged. That much heat would thaw out the frozen air immediately adjacent to Crystal Base. As you see, there is no abnormal vapor formation. Whatever force has attacked the outpost has certainly no counterpart in Earthly weapons. By Lyra, if we only had some word from the men stationed there!"

"Nothing came through but that thrice-repeated warning," McKernan's

voice rasped with excitement. "Here's the record tape."

X9 ATTENTION. KEEP TO SPACEWAYS. DO NOT ATTEMPT LANDING ON URANUS. DANGER. SIGNED. LT. ZAHARIUS, F7. IOS.

Yet scarcely had they finished reading it when a terrific explosion thundered through the huge freighter. The walls and floors of the plot deck quavered. Second Pilot Dollens lurched from his seat, his lips twisted in a horrified scream which died in his throat. Slumping forward, his body fell across the controls and dropped to the floor, fingers clutching spasmodically.

"Cut it away! Cut it away!" McKernan was screeching, one arm stretched upward toward the telescopic reflector. "They—they fired a neutron blast—struck us. I was looking at the reflector—saw it shoot out—from Crystal Base. But hurry!"

Nodding stupidly in response to the frantic cries from McKernan who lay flat on his back, Chapman virtually fell upon the controls. His brain seemed to be struggling against some horrible vice. With difficulty he forced his senseless hands to touch the controls.

"It's dead," McKernan was moaning as he dragged himself to an upright position. "Polaris! This silence—the drivers are dead. They struck us."

Straightening his gaunt old shoulders bravely Chapman turned away from the controls. His eyes met the fearful stare from McKernan, swung to the seemingly lifeless body of Relief Pilot Redgate and then to the moaning, twitching Dollens who lay at his feet.

"We're dropping, Mac," the captain's tone was low, oddly without emotion.

EVEN as he spoke the telescopic reflector became a hazy mass of murky, frigid clouds. The bodies of the men

tingled from the quickening clutch of planetary gravity which became increasingly pronounced.

"How far?" McKernan asked.

"We'll be down within a quarter of an hour," Chapman recited with the methodical calm of a lecturer. "There's nothing we can do about it but trust to the automatic brakes to let us down easy. The drivers are burned out. Which means that our neutron guns are useless but—" the old eyes became steel hard and glitteringly bright. "But as soon as we touch Uranus, we go into action. Get below, round up every man who's still on his feet. Space suits and side arms!"

"Yes, sir." McKernan grinned despite the whiteness of his face. "But where are we, captain?"

Chapman studied the instruments before speaking: "Approximately fifty Earth miles due south of Crystal Base. In other words, Mac, we'll land somewhere near the Kotandra valley."

Immediately, shouts from the forward ramp announced Dublinsky's hasty return to the plot deck.

"Chapman! Mac! Are you all right? What's happened? It's hell below deck!"

Staggering into the plot deck, the gasping, bloody figure of Charter Dublinsky swayed in wild-eyed wonder before the other two.

"Did we crash?"

Chapman spoke up: "Hello, no, Dublinsky, we were hit—we're dropping now."

"I know that. I know the feel. But by the powers, sir, that blow made a mess in the under decks. Half of the men are still out—two, I know, are dead—and when the drivers went off—glory, but it's like slow death. Those that have their senses are half crazy with fright. What are we going to do?"

A shudder, almost of depression, coursed over the vast transport. The sensation of floating downward changed

abruptly to one of strange, oppressive heaviness. Throughout the ship, blasters and officers alike, stiffened rigidly, their blood streams tingling with a new and almost fearful impulse of life. Land. The X9 was planet-docked.

The low, even tones of Captain Chapman's commands carried an exhortation to courage and alertness through the ship's phones. Trained for instant readiness against incredible emergencies the men of the X9 sprang to immediate, unquestioning obedience.

Although he had not moved from the plot deck, within a scant quarter of an hour Captain Chapman had assembled the entire personnel upon the two central decks of the ship. Massive ramp ports were swung to impermeable tightness. Lights were cut to a minimum. Every atom of the reserve energy of the now-silent transport was jealously husbanded.

"First Mechanic Rawlings reports all blasters in order with seven casualties, sir," Charter Dublinsky had returned to the plot deck to report.

Chapman nodded slowly. In the intensity of his thoughts one hand pawed at his bristly jaw. "All spacemen, glory to 'em!" he mumbled thickly. "And now—our first problem is to ascertain the state of affairs at Crystal Base."

"I volunteer, sir," Senior Pilot McKernan stepped forward impulsively. "Dollens is up now and Redgate's getting some life back. Unaided, it will take us a good month to repair the drivers. That will give me time to make observations at Crystal Base and get back—the council'll expect a report."

"The two of us—with a small party." Charter Dublinsky caught the alert gaze of Senior Pilot McKernan. "I—I have been on Uranus before, sir."

THE monstrous durosteel mass of the X9 blended swiftly into the undulating shadows of the murky, deep-gray landscape. Looking back, Dublinsky saw

the ruby sheen of the frontal port light glow with the flickering fire of a distant planet. Save for that single, faint beacon there was no evidence that the huge freighter lay dormant in the foreboding pall of Kotandra Valley.

A sudden yank upon the guide rope jerked him forward. Grimly, his teeth clenched in defiance against the fearful terrain, Dublinsky plodded on. Somewhere ahead of him the ponderous crunch of boots revealed the creeping line of his fellow Earthmen. McKernan had taken the lead with the three blasters following in file.

At the tail end of the guide rope, so essential in the frigid dusk of Uranus, Dublinsky brought up the rear. All wore the thick, electrically heated, regulation space suits and carried full pack with heat-ray pistols. Ahead of them the incline of the glass-brittle plains reached the ragged hill country beyond which they would find the great plateau whereon the pioneering Interplanetary had erected the only outpost upon this gigantic, frozen world of Uranus.

Fifty Earth miles. Steadily, methodically the shadowy file trekked onward. Earth phones hammered the continuous *scruff, scruff, scruff* of elephantine, gravity-balanced boots. One hour and fifty minutes of marching; ten minutes of rest. With difficulty, Dublinsky stifled an inclination to shriek out a burst of insane laughter. His back ached from the pack; legs throbbed in this tortuous wading against the gravity of bleak Uranus. The ear phones seemed to crackle and moan with the deep breathing of the five trudging Earthmen. And this damnable gray mockery of light!

Imploringly, the young charter lifted his eyes toward that gleam in the sky which was the sun. But what a feeble sun! He could stare at it in midday as one might stare into the limited glow of an ordinary arc light. Great Arc-turus! It was such a sight at such a

time as this that made a real impression of distance upon a man's brain.

The snaky line halted, tensed. The shock tore Dublinsky's harried brain into full, alert consciousness. Now McKernan was speaking, calling him to the front of the line. There was a ring of apprehension in the senior pilot's voice. Dublinsky clamped forward with the grace of a galloping ox. The three blasters huddled together in silent awe.

"Did you catch it?" McKernan quickly switched the space-suit radiophones to a wave length receivable only to the officer's instruments. Some impulse bade him hide from the three blasters any indication of indecision or perplexity.

"I wasn't thinking about listening," Dublinsky replied. "Something tingled through my ears—wait, now that I keep thinking about it I could swear it was a word."

"Precisely." McKernan's speech came in quick, excited bursts. "I was letting the receiver hold to a wide band—was listening for something—when it came like a flash. I distinctly heard the name 'Chapman.'"

"That was it!" Dublinsky exclaimed. "But another thing, Mac, and why haven't we thought of it before: That reddish glow hasn't been in evidence since the X9 landed."

"I'd thought of that, Dublinsky. However, there are several possible explanations. But listen—I'm going to use the field set—we'll listen a while—and then try a call."

As McKernan knelt down the better to adjust the portable wireless there came the faint tinkle as if his knee had crushed innumerable sheets of thinnest glass. Involuntarily Dublinsky shuddered. The ground was covered with the brittle flakes of frozen gasses. This far north they were reasonably safe, he knew, yet in the lower depths of the Kotandra there existed veritable lakes of the stuff. The weight of a man's body

on Uranus was great enough to pull him completely under the clinking, choking, incredibly frigid mass.

McKERNAN was risking a call now. Close about him hovered the other four. The shrill whine of the wireless screeched deafeningly through the sound-sensitive space suits.

"Patrol calling Crystal Base—Zaharius or Hood answer—special patrol calling——"

One of the blasters screamed, his leaded body toppling forward rigidly. Even as his cry froze off abruptly, the ear phones snapped the sound of instantaneously frozen air. There was no need for warnings or explanations. Every man realized the horrible significance of that noise. The blaster's suit had been ripped. The fellow had frozen to brittle death even before his stiffened body had clanked upon the indurate crust of the air-flaked plain.

"Follow!" McKernan had dared to utter that single command. Tugging frantically at the guide rope he hurried the patrol off a wave into the darkness. Their one impulse was to get away from that telltale wireless. Scarcely daring to breathe, the four pounded speedily forward. Behind them, the body of the stricken blaster was dragged over the ground as if it were a log.

Now they stopped. Trembling hands released the guide rope from the dead blaster. Dublinsky crowded close to the senior pilot, the two blasters keeping as near as possible to the officers. McKernan swiftly adjusted the radiophones to a minimum power. So faint indeed were the instruments that Dublinsky was forced to hold his space cap next to McKernan's as they crouched in a ravine.

"We must have barged into a reconnaissance outfit," the officer's whisper rasped softly through the phone. "They may have sighted us—anyway the wireless gave out our position. Which one did they get?"

"Blaster Koremitsu," Dublinsky replied, his throat getting strangely dry from the fearful strain.

"Listen!" The rush of his deep breathing was louder than the whispered word. "I'm going to raise the receiver band—— Blasters Reh and Schalk—do you hear me? We're sounding for the attackers. Don't make a noise even when you breathe. Ready!"

Nerves throbbed with the exquisite torture. Quivering with tension, the Earthmen hovered low to the frigid ground, every ear strained so that even the sound of their thumping hearts seemed magnified to the tramping of a marching army.

DISTINCTLY now there sounded in the phones a weird sighing as of a gentle breeze through the needle-stiff leaves of mountain pines. Sight was impossible in the dull, imprisoning fog which enshrouds Uranus. Even the ineffectual glow of the sun was fading as that too-distant luminary sparkled at the very tips of the near-by hills.

"Puffies!" McKernon uttered the word sharply. "You know what that means?"

"The natives? But why should they attack Earthmen? I don't understand it, Mac. The Puffies are harmless. Never knew them to act up. Great Polaris—I have it. Some one—some Earthmen—has organized the natives—used them to overcome the outpost. But wait—that means there is an Earthman in that party who attacked—the Puffies wouldn't know enough. And that call to Chapman—listen, Mac: We've run into a nasty mess. I've heard of men going crazy on these distant outposts."

"That's what I think, too," McKernan unconsciously raised his voice. "Which means that somebody is out here looking for the X9. An Earthman shot Koremitsu—probably used a native barbed javelin. At any rate we've got to get back to the ship. We'll trail

them—get them from behind us as they try to bore in. The Earthman will use a neutron torch. He's just using these half-witted Puffies to get him around—their ears can pick up sounds better than a radiophone, you know. Come on—we may have time—we'll get this outfit."

"I know, but wait," Dublinsky restrained the impulsive senior pilot. "Look here, Mac, I've got an idea. If some gang has managed to overpower the command at Crystal Base then we haven't much of a chance until we've got control of the neutron guns there. Besides, Hood and the others may be prisoners. And you know what the basic code says about that. I might get in. I stopped at Crystal Base once—my first trip out—two years ago. I know the outpost thoroughly. Protecting the X9 against some raiding party is only half the job."

McKernan held the young charter's tense body close. "You mean—you'd go on—try to get into the outpost? Why, man, if they've got control of the guns that would be suicide."

Dublinsky's voice was oddly composed. "I know, Mac. But I—by the powers, fellow—I am an officer in the Interplanetary."

For a moment the two stood there, hooked paws clasped. The thick cloudiness of Uranus deepened to an impenetrable gray fog. Not until one of the blasters in nervous impatience reached out and touched Dublinsky's shoulder did a one of them speak.

McKernan's voice trembled. "All right, charter. I understand. From now on we're following you."

"No. Not that, Mac. Your idea is good strategy. We must save the ship. Listen—you go back—take one of the blasters with you. When you reach the X9, tell Captain Chapman that—that—"

"That you're one hell of a grand spaceman even if you are just a kid. Dublinsky. Righto—we'll do that."

IN THE FAINT sparkle of starlight the massive walls of Crystal Base glistened with the sheen of polished silver. Across the high plateau shrill blasts of cloudy air stuff cut sharply against the thick walls of the Earthmen's outpost. The metallic prongs upon the paws of Dublinsky's space suit tingled against the smooth, hard rock.

Dublinsky trembled. This was evidence of man. Alone in all this incredible land of dark, cold monotony Crystal Base was Earthly. But the crawling bulk of the huge blaster, Shalk, quickly aroused in the young officer the need for cautious, immediate action.

Getting to the top of the great structure was slow, hard labor. Dublinsky worked around to the eastern slope, his pronged fingers feeling for the jagged touch of unfinished stone. From this point the ascent was a long, perilous climb, much as one would wriggle and squirm up the bulging sides of a huge dome. One slip meant a swift, awful slide to the rocky plateau. But it had to be done. There was no thought of turning back.

Slowly, making sure of each move, the two Earthmen crawled upward. Ear phones were charged with the gasping surges of labored breathing. Yet steadily hooked prongs dug into rough stone. Muscles ached. Bodies seemed made of lead. Standing erect, their space boots nullified a small portion of the planet's fearful gravity, but this gliding upward upon stiff, straining stomachs was bitter, nerve-racking torture.

"The air intake—it's this way." Dublinsky had grasped Shalk's hand. They groped across the top.

Soon the stridulous crunch of boots as they ground into masses of brittle air flakes checked their forward movement. A mountainous pile of the crisp, glassy flakes loomed before them in the dark. This was the air intake. At regular intervals the air-conditioning mechanism would gulp in a portion of the

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flakes which were evaporated within the breathers in order to furnish a continued supply of clean, fresh, exhilarating air.

"I'll go first," Dublinsky outlined his plan to Blaster Shalk. "Then you tunnel down into the pit. When the jaw gaps again—let yourself drop. You won't fall far. I'll be waiting for you."

For a tense, agonizing moment Dublinsky huddled down in the flaky mass. Legs were set for the drop. Lips were drawn in a tense line across his strained face.

Without warning he felt himself fall; crunched, sprang, twisted. In a moment he had huddled his shaking body against the wall of the huge intake tank. Sweat poured down his face. Great Arcturus, but he was nervous! How long would he have to wait for Shalk? Minutes? Hours? Waiting became sheer misery.

The slushing clump of a landslide jerked him to full alertness. In a moment Shalk was stumbling blindly. Dublinsky grasped the big blaster's arm, pulled him close.

"Your heat pistol—follow me—keep a hold on my suit—this way. Bend over; hold it!"

Through the short length of the tunnellike tube the two men groped only to emerge into what seemed a vast, wind-torn cavern.

"Steady now, Shalk," Dublinsky whispered sharply. "In a moment that pile of flakes will be evaporated—the air will rush in through this tube. Brace yourself—as soon as the draft settles, we'll hike across—and don't drop your pistol."

"Yes, sir," Shalk mumbled bewilderedly. "But I don't—"

The blaster's reply was lost in the sudden gale of air which tore through the tube into the main air chamber. Awkwardly, the big fellow slunk back against the smooth walls of the tube, his hands clinging fearfully to the tense, slight body of the officer.

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"Ready—keep your hold; we're crossing."

A grim, mirthless grin was etched upon Dublinsky's mouth as the trembling prongs felt over the strange mechanism at the very center of the air chamber. Working blindly, his heart thumping madly, he studied the thing. Suddenly an explanation cut sharply from the constricted throat.

"What is it, sir?" Shalk's voice quavered.

"Your pistol—here—steady it—when I give the word, turn on the power. We'll burn out the pivot roller with both guns. Now—let it go!"

The huge drum became instantly vivid with the harsh, blue light of the two, metal-consuming heat guns. Sparks flew over the bulky masses of their heavily suited bodies. Wrists buckled with the strain. A cloud of bluish-white smoke shot upward, stringing swiftly into the whirlwind current.

A quick lunge and the resistance to the guns was checked. A thunderous rumble roared from the mechanism. Then came stillness. The air currents in the chamber ceased. Weakly, Dublinsky sank back. He was trembling and his body was soaked.

"What now?" Shalk asked anxiously.

"Back—I've got to get out. They'll feel the effects within an hour—but it's worked—we've cut off their air supply." He paused for a moment then turned and clasped both arms of the silent, thoroughly awed blaster.

"Hear me, Shalk. In the name of the Interplanetary, I'm asking—not commanding, Shalk—"

"Say the word, sir."

"Listen. You stay here—there's power left in your gun—stand guard. Shoot any one who tries to get up here to repair the conditioner—until I return. It depends on you, Shalk."

"Glory, sir"—the huge fellow stiffened and his pronged fist returned the pres-

sure from Dublinsky's clasp—"I'll guard it—to the death!"

"Bless you—you're a blaster—a spaceman. I'm going now—can make it out by way of the ejector—the tube through which the conditioner ejects impure gases. It'll take time—but—so long, Shalk."

FURIOUS, stubborn energy burned hot in his blood. Dublinsky drove his lean, muscular body with all the skill his spaceman's training gave him. He seemed to move by inches. Time expanded to a torturing mockery of endurance. How many hours had passed he could not guess. The ejector was long, smooth. Frequently, the vanes and regulators blocked his passage, requiring patience and a knowledge of outpost conditioners to manipulate them. When he finally emerged atop the great domed roof of the giant star, the Sun, had already risen in the dark-purple sky of Uranus.

The sight brought a moment of panic. He'd taken too much time. He could never make that fifty-mile hike to the X9 in time to carry out his plan. Nausea gripped him. Tears clouded his eyes. The job was too big. He had done his duty, to be sure, yet there comes a time when duty alone is not enough. What was it that the code said? Now he remembered. Something about a spaceman living beyond the circumscribed limits of a single individual. Dublinsky laughed weakly, feverishly. "Sacred Nebulae, a man must be a superman, know no limitations." He clenched his fists. Eyes brightened. He'd do it. Hood the commandant, Zaharius, the flash marker, and the loyal, brave outpost men—if he failed they'd die, smother to death. He'd have to save them. He'd have to do something and do it quick.

Another hour, seemingly interminable and yet all too short, found the panting, tense figure of Charter Dublinsky stand-

ing before the ship portal, the gateway to Crystal Base. Charging his radiophone to maximum power Dublinsky called: "Crystal Base attention—Crystal Base attention—special patrol from Freight Transport X9 calling—open up—open up."

Would it work? Dublinsky scarcely dared to think. Every fiber of him thrilled with the daring of his ruse. One man against an outpost. Then his breath quickened. The portal opened. He ran into the valve chamber. Ports swung with majestic solemnity. A hallway opened before him. Quickly Dublinsky entered the outpost. It was a matter of minutes until he came into the commandant's office. A queer shock tingled his spine. Before him stood three Earthmen, gasping, blue-faced. He was face to face with the leaders of the outrage at Crystal Base.

The tall, black-mustached fellow who had been seated at Commandant Hood's desk rose quickly, his mouth opened to speak. But Dublinsky beat him to it. His radiophone blared forcefully.

"In the name of the council I order the immediate and unconditional surrender of Crystal Base Outpost to the interplanetary transport X9."

The two who had evidently been in consultation with the black-mustached pirate stared in open-mouthed wonder first at the still space-suit-clad freighter officer and then at the scowling, heavily-breathing man behind the desk.

"The council can—" the fellow choked as he struggled for air. His face darkened and his eyes seemed momentarily glazed.

The sight fired new hope in Charter Dublinsky. The air supply was fast diminishing. This would mean that the pirates could not hold out much longer. An impulse stirred him to impress this advantage upon the leader.

"You can't last much longer. Your

air is about gone. And we'll keep it off until——"

"Then you did it! Your ship's used some—some new weapon." Abruptly the leader whirled upon one of the subordinates who cringed before the man's badly glaring eyes.

"Damn you, Trauber—you missed—thought you knew how to fire a neutron cannon. Now we're——"

Dublinsky's voice cut through the gasping tirade: "Release Commandant Hood and all outpost officials at once. I'll give you ten minutes—ten minutes to surrender."

IT WAS a chance thought. Dublinsky grinned at his own audacity. But he had them backed up. Evidently the marauders knew precious little about modern spacemanship else they would have known how to check up on the air conditioner. But a new fear assailed him. Evidently Hood and the others had been killed, otherwise these fellows would have forced them to restore the outpost's air supply.

The black-mustached fellow was approaching him. Dublinsky tensed. His eyes through the space cap glared fearlessly into the wide, insane stare of the leader.

"So—that's your game," the man muttered. "Well—here's my answer."

Swiftly placing a whistle to his mouth he blew a shrill blast. Almost at once the room became filled with the gliding, puffing figures of the natives. Instinctively, Dublinsky backed to the wall, one hand resting upon the butt of his heat pistol.

"Surrender?" The man shrieked. "The Black Cross surrenders to no puppet of the council." Drawing deeply of the foul air the leader suddenly pursed his lips. The quick, short blast of his whistling acted like a lash upon the hovering crowd of round-eyed natives.

Like nothing so much as a group of

animated puffballs, with greasy feelers for legs and arms, the stupid creatures bounded in the air, circling frantically, the wicked eyes at the top of their egg-shaped bodies fixed upon the Earthman toward whom the leader gestured.

Dublinsky understood. The pirates would not surrender, neither would they accept death with fatalistic quiescence. The leader was commanding the Puffies to attack the intruder. A long blast from the furiously whistling leader caused the obedient, beastlike creatures to form a semicircle. From among their fringed appendages there appeared the frail-looking barbed javelins, the only weapon used by the native Uranians.

Cold, ruthless fury possessing his body, Dublinsky sprang at the line. His heat pistol out, he charged straight toward the leader. He couldn't waste the energy upon the Puffies. There was a scant quarter charge remaining. His one instinct was to get the snarling, black-mustached Earthman.

The maneuver threw the Puffies into a panic. In a mad whirlwind of shrieking bewilderment they flung their balloonlike bodies about the room. Those who had been struck by Dublinsky's sudden drive forward bounded speedily across the room from the impact.

But the Puffies had served a good purpose after all. By the time Dublinsky had torn through the line the three pirates were dashing from the room. Dublinsky fired quickly toward a flying pair of legs. A blinding lance of flame reached out. With a shrill cry of terror the man slid headlong into the hallway beyond. Straight through the middle of his back gaped a hole of crisply singed flesh and bone.

One glance and Dublinsky saw that the corpse had been one of the two subordinates. But the hallway was empty. In the commandant's room behind him the crazy Puffies bobbled around in idiotic circles, sensing trouble which was

beyond the comprehension of their feeble intellect.

Which way to go? What to do? Dublinsky trembled with indecision. He had to get control of Crystal Base and repair the air conditioner or else assure himself that the faithful outpost men had actually been murdered.

Abruptly a strange, fearful paralysis seized him. Muscles throbbed to respond to frantic brain-impulses but could not move. A weird, orange-red glow seemed to emanate from the very walls of the great structure.

A voice behind him barked. "Now—you from the X9—you'll do the surrendering!"

Dublinsky's heart ached with the strain to turn around, to grip his heat pistol and burn the fellow's guts to ashes. Yet he was powerless. A heavy fist gripped his shoulder, forced his lifeless body to twist around.

Staring at him with mad triumph in his gloating eyes was the black-mustached leader, garbed in a flowing, apparently silvered robe and space cap similarly coated.

"Quick—order your ship—release their damned choking web—order them—or I'll rip your space suit."

SWEAT streamed down his face as Dublinsky strove to utter a sound. The pirate laughed at his futile efforts and then moved close so that his own cloak partially covered the paralyzed officer.

"The Black Cross has mysterious weapons, too," the leader was saying. "But hurry—we'll make a bargain: Release our air—and I'll agree—let you go—let your damned ship get back into space. Final—my word on it—but hurry!"

Dublinsky thrilled with frantic energy. He could move his hands beneath the protective cloak. Now it was over his head. He couldn't see; nevertheless the strange glow no longer clutched at his throat with its horrible, muscle-binding

hold. He was thinking fast—about Hood—about the X9. What should he do? The leader had grasped the heat pistol, tossed the weapon to the floor. Dublinsky could feel the pincher grasp of the man's fingers upon his forearms.

"All right—turn off that stuff."

The leader's voice rasped as the fellow struggled against the poison of the foul air.

"No tricks. You'll not take us alive—nor the prisoners."

Dublinsky's heart skipped a beat at sound of that word. So the pirates had not murdered the outpost men. There was still a chance to save them. But he would have to be quick. Unless the air conditioner was repaired within an hour they would surely die.

"Quick!" The pirate was struggling to speak coherently. "Or I'll rip your suit—let you die like—"

"I'll do it," Dublinsky burst out.

The man backed away. For an instant longer the frightful, mysterious force gripped the charter. Then at a signal from the leader the glow faded. Dublinsky drew a deep breath. He raised his eyes to face the menacing glare from the burning gaze of the black-mustached leader. From beneath the fellow's protecting cloak gleamed the charred barrel of a heat gun.

"Give me a quarter of an hour," Dublinsky muttered. "Air-conditioner chamber. Then have your men bring your prisoners there—every one there—understand?"

The leader nodded grimly, prodding him with the heat pistol. Dublinsky's brain became a turmoil of thought. He had to thwart the pirates, yet he could not murder the imprisoned outpost men in the attempt. The dilemma was maddening.

Abruptly he tensed. Before him were the massive tubes of the conditioner, the product of Earth's scientists. The sight was imposing, thrilling. He remembered

his first trip as an officer in the Interplanetary. Strong emotions burned through him. He loved the service, loved law and order and the unlimited conquest of his kind. Loved them more than life itself.

A grim smile was affixed to his taut, colorless lips as Dublinsky held a spare pivot roller in his hooked paws. He had an idea. He would yet save Hood—and outwit the devil who continually hovered at his back, admonishing him to hurry by repeated prods with the heat pistol.

The pivot cleared. Dublinsky toiled skillfully, measuring the time by the increasing strain of the other's breathing. The man was weakening. Dublinsky replaced the pivot. His fingers rested upon the recharging levers. Now, the time had come. He struggled to keep the eagerness and hope from his voice.

"Here, hold this lever down," he gestured to the leader. "Steady it—while I—"

The pirate stretched one hand to the lever. The other held the heat gun to Dublinsky's side.

The charter's voice roared out: "Shalk—fire at the light—fire!"

It was a chance. By pressing on the lever the leader had opened a small aperture through which the blaster, Shalk, might point his heat pistol. Would he do it?

"What do you—"

The leader's voice ended in a hideous scream of death as a stream of vivid energy flowed from a tiny opening in the tank to burn straight through his body.

Simultaneously, Dublinsky released the starter. The room roared with the sound of swiftly working machinery. For a long, breathless moment the charter stood there, trembling, his rounded gaze fixed upon the lifeless thing at his feet.

A sudden scuffling of running footsteps from the hall beyond aroused him.

A voice called out. "Here they are—I've—"

The pirate stared open-mouthed, too stunned to fire his own gun. That second was long enough for the alert Dublinsky to hurtle across the room. Madly, his throbbing nerves releasing themselves from horrible tension in the swift leap, he threw the man on the floor. Fists hammered the stunned body into senseless pulp.

Then Dublinsky stood up, swayed drunkenly. Before him, chained wrist to wrist, were Commandant Hood, Flash Marker Zaharius, and four others of the outpost command.

Dublinsky removed his space cap. His eyes, suddenly turned, held to the wide-eyed gaze of the foremost prisoner.

"Charter Dublinsky of the X9, at your service, sir."

Commandant Hood choked, grew red in the face. "Why—why man—glory to you, sir—but—damn it—get these irons off our wrists."

THIRTY EARTH DAYS later, the X9, her massive hull pointed toward distant Saturn, fired the farewell salute to the murky haze of mighty Uranus. On the captain's deck, old Jon Chapman rubbed at the ruddy bristles of his chin and surveyed the lean-faced young charter through narrow, flint-hard eyes.

"By Lyra, son, I still don't see how it was—but then—you just kept going at it—kept doing your best plus more. That's what it takes to make a space-man! Funny about this Black Cross gang—seems that they just scuttled down a bit ahead of us—had this paralysis ray—were all set to take the X9. Capture the X9, indeed! No, sir—not so long as real Earthmen sail her through the spaceways; eh, Dublinsky?"

"No, sir." The charter blushed. "But pardon me, sir, I've just received the first flash from Saturn. They've sighted us—O. K'd our course—and all's well."



*The train passed over the spot—a noise like an explosion—
then—nothing!*

The Train That Vanished

by R. R. WINTERBOTHAM

THE linking of astronomy, railroading, South American revolutions and Mrs. Kleinhammer's boarding house, to solve one of the many riddles of celestial dynamics, required considerable special knowledge on the part of Dr. Steven Walleck, the eminent scientist. He had never operated a boarding house, nor sponsored a revolution and his knowledge of railroads had been limited to his travels.

But Dr. Walleck knew astronomy and he was acquainted with curious unbelievable things of science and he recognized at once the value of the three unknown factors in his equation. The only element of chance that entered into the problem was his visit to Mrs. Kleinhammer's boarding house in Bristol, Arkansas.

Dr. Walleck had selected Mrs. Kleinhammer's boarding house as his place of lodging because it was an attractive place. At the time, his problem dealt only with railroading and astronomy. Bristol was a railroad center—the headquarters of the Arkansas & New Orleans line—and those who lived with Mrs. Kleinhammer were railroaders.

The other guests of the lodging house treated Dr. Walleck with polite indifference, recognizing him as a man who had never punched tickets nor eased a throttle, although Dr. Walleck might have told the lodgers many things of nebulae and star systems. An exception, who attached himself to Dr. Walleck, was Donald McDonald, a crusty old brakeman and a gem in the rough. McDonald, although of Scotch ancestry,

had become a citizen of the world. He had braked trains wherever railroads existed.

"Yes, sir, I have worked on lines all over the world!" boasted McDonald. "I have helped the chinks with their end of the Trans-Siberian. I fired an engine on the Cape to Cairo. I tendered a forty and eight in France and I dusted a caboose in Bambarro, the country that's always having a revolution in South America."

"Perhaps you can enlighten me on some facts I have been wishing to learn," suggested Dr. Walleck.

"Well, perhaps I can."

"It's quite a story, and believe me; a queer one," began the scientist. "I'm looking for the A. & O. railroad. I've checked throughout this continent and I can find no such a line. I thought perhaps the Arkansas & New Orleans might be the one I was looking for. But it is not."

"I worked for an A. & O. once," declared McDonald. "'Twas the Aruntas Y. Oriente line, down in Bambarro, South America. Anything you tell me strange of that line will not be dooted, stranger."

A GLEAM came into Dr. Walleck's dark eyes. He rose from his chair and with an air of mystery led the Scotchman to the quarters assigned to Dr. Walleck. Closing the door behind him, Dr. Walleck took a key from a ring and opened a trunk standing in the corner.

"I have been hooted and jeered over

this until I decided to not tell the story again. So far, it has proved to be a stubborn mystery—one of those borderline things, between science and witchcraft, which scientists refuse to believe and superstitious persons believe too easily. I am quite certain, however, that there is a logical, scientific explanation. Look!" Dr. Walleck pointed within the trunk.

McDonald, half fearfully, peered past the tall, dark, mysterious man of science into the trunk. Then he looked relieved.

"Humph!" sniffed the Scotchman. "'Tis nothing but a hunk of rock."

Dr. Walleck chuckled. "So it is, ordinarily speaking, a 'hunk of rock,'" admitted the scientist. "But it is an unusual stone. It is a meteorite—that is a meteor, or shooting star, which has hit the ground."

McDonald gaped as Dr. Walleck grasped the stone. It had been sawed in twain through the center. The upper half of the stone, about as large as a football, was lifted off the lower by the scientist. In a cavity in the center was a half-melted metal object, which still held the semblance to something man-made.

"Blast me!" ejaculated McDonald. "It's a coupling pin! A coupling pin in the center of a shooting star!"

"Now," went on Dr. Walleck, "if you will look closely, near where the pin is melted at the end, you will see an alphabetical marking. As near as I can make out the marking is 'A. & O.' I assumed this was the name of the railroad which at one time owned the coupling pin."

Gingerly McDonald picked up the coupling pin and examined it. He cleared his throat and squinted his eyes before he spoke.

"You know, professor, I think I can tell you of the road," he said solemnly. "I worked for it. The line is the Aruntas Y Oriente, all right. I believe

'tis a pin from the train that disappeared!"

"Disappeared?"

"Yes. Vanished without a trace!"

"Come now, McDonald. I don't mind your disbelieving, but as I said before, I hate to be strung along."

McDonald scratched his sandy hair. "No, professor, but it's true. It happened about eleven years ago. I know the exact date for it was my birthday, December 21, 1925. 'Twas early in the morn, about half an hour past midnight, I should say."

"In Bamborro?" Dr. Walleck knew the South American country.

Bamborro is a scraggly little nation lying almost exactly on the equator. Aruntas, the capital, is on the west edge, at the foot of the Andes. A railroad connects Bamborro with Socorro, the principal city of the eastern part of the nation. The curious thing about the railroad is that so far as science has been able to determine, it runs almost exactly atop the equator most of its length.

"Aye, in Bamborro," asserted McDonald. "I was braking a freight from Socorro. We pulled on a siding to let another freight pass. This freight, filled with munitions to put down a revolution, never arrived, although it had been checked out of Aruntas in perfect order. The train vanished off the face of the map. We blamed the revolutionists."

"Possibly they were responsible," suggested the scientist. "Perhaps the train was dynamited."

"Maybe that's the explanation, sir." McDonald drew his face down studiously. "In truth, the next day a track walker found a place about ten miles east of Aruntas where the track had been blown up. But even the best explosive does not reduce to dust, sir. There was not a splinter of the engine and five cars which left Aruntas."

DR. WALLECK grew excited. Taking a brief case from his bureau drawer, he drew from it a letter.

"As I have told you, I have been kidded a great deal about this meteorite," he told McDonald. "My assistant, Vance Gibbons, is at present in Chicago, writing a book about curious meteors and meteorites. Seven months ago I purchased this stone from a Kansas farmer, intending to send it to Vance.

"As you probably do not know, more meteorites are found by Kansas farmers than by persons in any other section of the world. Kansas farmers know meteorites have a value and any farm boy can tell a meteorite stone from an ordinary rock.

"Before expressing the meteorite to Vance I cut it in half as a method of determining its composition. The result was the discovery of the coupling pin.

"I wrote Vance of my find, along with a photograph, and asked him if he could throw any light on the mystery. Vance has known me many years and he has never seen fit to poke fun at my discoveries before. The letter he wrote back offended me, in that he accused me of trying to perpetrate a hoax. This letter is from Vance.

"He says that I must have heard the story told by a drunken sailor in New York about ten years ago, which he is incorporating in his chapter concerning superstitions resulting from meteoric displays.

"This sailor, Vance explains, signed an affidavit to the effect that early in the morning of December 21, 1925, while on watch on a tramp steamer crossing the equator, off the east coast of South America, he saw a huge meteor sail across the sky. A few minutes later the sailor said he heard the sound of a railroad locomotive whistle. Vance adds that the whole thing is preposterous. Meteors sometimes do make explosive sounds, but nothing like a locomotive whistle, he says."

"But the date!" exclaimed McDonald.

"That's what I meant to bring out! The date of the phenomenon corresponds exactly with the date of the A. & O. train's disappearance."

McDonald produced a bandanna handkerchief and wiped his brow.

"I think I can arrange for your leave of absence from your work," said Dr. Walleck, "if you will accompany me, on a salary, to South America. We're going to get to the bottom of the train's disappearance. And I think it will be one of the biggest scientific discoveries of all time!"

JOSE CORDOVA, minister of transportation of the republic, Bamborro, looked over his morning mail. Near by stood his pock-marked and malignant-looking secretary, Emanuel Diaz.

"*Carramba!*" exclaimed Cordova. "At last Bamborro is to have a distinguished visitor!" He spoke in Spanish, the national tongue.

"*Quien?*" asked Diaz.

"Ah! His name is Dr. Stephen Walleck—"

"Never heard of him!" spat Diaz.

"I confess, Emanuel, that his name is also unfamiliar to me. But he is an investigator and these American investigators are clever fellows. Have you never heard of Señor Ivy Frost and Señor El Shadow?"

Diaz's shifty eyes narrowed. "And what is there to investigate in Bamborro?"

"You have never heard of the vanishing train, eh? *Mio hermano*, Juan Cordova, was the engineer of that train, *tambien!* With the help of Señor Walleck, I shall avenge his murder! You, Emanuel, shall meet the visitor, make him comfortable. He will arrive on the through coach from Brazil."

Bowing stiffly, Emanuel left the room. As the door closed behind the shifty-

eyed secretary, his pace quickened. He hurried down the corridor to another office. After entering, Emanuel closed and locked the door behind him. From a drawer, the secretary pulled a bulky black box. He opened it. It was filled with coils and a small electric motor.

"Eleven years!" whispered Diaz. "For eleven years I have worked to restore my invention. Now the time is ripe. I shall brook no outside interference." His hand stroked the box. "A superray!" he muttered. "A ray that reduces steel to dust."

Diaz's face was pale; his lips twitched. He had not known that his first experiment would cause a train to disappear. His invention had disappeared with the train. Eleven long years it had taken him to reconstruct the invention.

At that moment, the through coach which had carried Dr. Walleck and the Scotch railroader from Macapa, Brazil, was being transferred to a train which would carry them from Manaus, along the banks of the Rio Negro, across the international boundary into Bamborro.

As the train left Socorro, McDonald, his face fused with happiness, viewed familiar scenes along the short line.

"We're following the equator now," declared McDonald, as the train puffed through the jungle toward Aruntas.

"Interesting, from a scientific viewpoint," Dr. Walleck replied. "This train, traveling fifty or sixty miles per hour along the equator, is losing 967.66 miles per hour in its race with daylight. If the train could move 1,037.66 miles per hour, the Sun would never set, but appear to remain stationary overhead.

"The Earth is 24,903.957 miles in circumference at the equator and the Sun apparently travels approximately one twenty-fourth of that distance every hour.

"On the other hand," the scientist continued, "to go around the world in twenty-four hours from pole to pole would not require such a speed. In fact,

a train need move only 1,034.07 miles per hour. The distance is 86.18 miles shorter due to a slight bulge of the Earth at the equator, due to its rotation."

McDonald slapped his thigh. "That's it! Centrifugal force! Do you know I've a hunch that the train that vanished was thrown off the Earth by centrifugal force!"

Dr. Walleck's eyes showed amusement. "I'm afraid you are wrong," he said. "If that were the case, there would be records of almost daily disappearances along the equator. This train would be in danger and so would every one who traveled on the equator. No, I'm afraid your theory is a little wide of the truth, Mac. But I'll keep it in mind."

A POCK-MARKED man came through the coach and took a seat opposite the two Americans.

"Pardon me," said the arrival, "but do you happen to be Dr. Walleck and Señor McDonald?"

"Why yes," admitted Walleck, "and who have we the pleasure of meeting?"

"I am Emanuel Diaz, secretary to the minister of transportation, to whom you wrote of your coming." The Bamborrovian handed his cards to each of the Americans. "I understand you have come to our country to investigate a strange accident which occurred on our national railroad years ago?"

"That is the purpose of our visit," agreed Dr. Walleck. "Perhaps you can help us?"

Diaz placed his finger to his lips.

"There are revolutionists everywhere," he whispered. "We must act cautiously. It will be best for you to leave the train at Cucuhao, twenty miles east of Aruntas. From there we will go to the capital by motor car."

Dr. Walleck looked at McDonald, who shook his head.

"It will make no difference," said Mc-

Donald. "Me, I like to ride the rails. No revolutionist knows of our coming?"

Diaz shook his head. "You must believe me, gentlemen, when I say your mission had best be abandoned. Your lives will be in constant danger if you attempt to solve this mystery."

Dr. Walleck's keen eyes sought those of the Bamborroyan, but Diaz did not meet the glance. Dr. Walleck seemed to discern a veiled threat in the secretary's warning. The threat meant that this man knew something—

"We'll go with you," decided the American scientist.

At Cucuhao, Diaz led the Americans to a sedan, waiting at the station. The Americans got in the rear of the car and Diaz took his place at the wheel.

"My chauffeur is ill," he explained.

The car started with a jerk. It followed a paved highway through the jungle. For miles the road curved in and out through the dense tropical growths. Then a sudden turn brought the party abreast of the railroad.

"Here," said Diaz, slowing the car, "is where the train vanished eleven years ago."

He applied the brakes, stopped the car, alighted on the pavement and opened the door for his passengers. As Walleck and McDonald got out of the car to inspect the scene, they found themselves staring into the muzzle of an ugle automatic.

McDonald swore huskily at the sight. Dr. Walleck smiled calmly and raised his eyebrows slightly.

"What does this mean?" he asked.

"You have taken what they call in America, 'the one-way-ride'!" growled Diaz in a husky voice. His lips curled into an ugly grin.

"So that's it!" snarled McDonald. "Now listen here! Uncle Sam will have his marines down here if you——"

"Shut up!" barked the Latin. "They will never find your remains."

Still holding the gun on the two

Americans, Diaz lifted a black box from the front seat of the car. At the point of the gun, Diaz forced the Americans to carry it to the railroad track. There it was fastened to the ties. The secretary brought two carefully concealed wires from the underbrush.

"I have tapped a near-by power line," explained Diaz. "This box is filled with superexplosive—an electrical ray that demolishes steel, turns it to dust. My first black box caused the train to disappear nearly eleven years ago. It took me eleven years to build a new one. Now I have several. With them I shall conduct a siege of Aruntas. It will be my own revolution, ha! I shall force the abdication of *El Presidente!*"

Diaz forced his captives to face the tracks. Dr. Walleck felt a blow on top of his head, and he was plunged into unconsciousness.

DARKNESS was falling with tropical quickness when Dr. Walleck opened his eyes. His legs and arms were bound and his body was pressed against a box.

His head and his feet were pressed against something hard. Rails! He was tied to the railroad track. Walleck heard a groan. McDonald was bound to the track beside him, on the other side of the box.

In a flash, the fiendish plan of Diaz became apparent. The two Americans would be reduced to nothingness in the same blast that wrecked the train.

In the distance, Dr. Walleck heard the faint tenor howl of a locomotive.

The headlight of the engine appeared. Walleck struggled with his bonds. "Can you get loose, Mac?" asked the scientist.

"No! The fellow knew his knots!"

There was little hope. The train was now less than a mile away, straining forward toward the two human bodies fastened to the rails. Walleck's bonds held as firmly as they had ever been.

Was the train slackening speed?

What caused the engine to slip its drivers as if it was carrying a heavy load uphill? If anything, the grade sloped toward the east, the direction in which the train was traveling.

Walleck felt a pressure on his ribs. It was not the bonds; no ropes crossed his chest.

"Who's pushing us?" asked McDonald.

Some enormous force was pressing against Walleck's chest, crushing it back. The scientist groaned. The train felt the force, too. It puffed slowly to a stop, a quarter of a mile from the two bodies.

Down the track ran a squad of soldiers. They too felt the invisible barrier. They struggled to a stop and could move no farther.

"*¡Ai!*" called Walleck in Spanish. "Search the jungle for a power line and cut the wires! It is electricity that holds you back. Then come here and unfasten us!"

For minutes Walleck lay, panting and gasping under the tremendous pressure. Then, suddenly, the force was released. The electric motor within the box stopped its whine. The power had been shut off.

Soldiers returned from the jungle to cut the bonds that held Walleck and McDonald. With them they brought a dejected man—Diaz, who had been hiding to watch the result of his handiwork.

As the scientist and the Scotchman rose to their feet, José Cordova, who had been riding on the train, came running forward and grasped Walleck by the hand.

"It is a pleasure, *amigo mio!*" he cackled like a bantam. "I meet the clever American, eh? The investigator is on the job before he arrives, *si?* *Yo comprendo!* Dr. Walleck, he never fail; is it not so?"

Dr. Walleck laughed heartily. "He

came near failing that time and he would have, had it not been for the ingenious invention of Señor Diaz. Only good fortune saved both us and the train!"

"*Como?*"

"I'll try to explain later, but first, señor, get me to a hotel. I've been lying on a railroad right of way for hours. Before that I'd been traveling for days. I need food and a bath. To-morrow, I'll tell how the train disappeared. Tell some of your army to gather up that black box—I'll need it to explain the mystery."

JOSE CORDOVA, minister of transportation, and the President of Republic Bamborro met Dr. Walleck and Donald McDonald the following morning in the minister's office in the capital building.

After the formal greetings, Dr. Walleck plunged at once into the explanation of the missing train, that all were awaiting.

"I'm afraid I'll have to assume a somewhat didactic class-room manner," declared Dr. Walleck. "I am handicapped by your lack of understanding of English scientific terms and so I shall be obliged to follow somewhat circuitous routes in order to make myself clear. I shall go slowly, but I warn you, you'll all be dizzy before I'm finished. I shall explain why the train left the Earth eleven years ago, not as a matter of impulse, but in obedience to natural laws."

Dr. Walleck selected a piece of chalk from a drawer of Cordova's desk and went to a blackboard, used for marking railroad information, at one side of the room.

"When science was young, men observed the mechanics of the universe and called the motivating power 'force,'" began the scientist. "There were strange entities called force of

gravity, magnetic force, centrifugal force, natural force and force in general. As the curtain of knowledge rolls back, we lose sight of force and see motion. Einstein explains gravity as a line of least resistance. Instead of magical genii who tug, pull and warp to make the Earth go around, we have laziness.

"But calling gravity by another name does not change its nature. It holds us to the Earth. McDonald quite naïvely suggested to me on the train yesterday that centrifugal force might have thrown the missing train off the Earth. He got the idea from the fact that the Earth bulges at the equator. It is quite possible that such a thing might happen, if there were no gravity.

"Diaz, who is now in prison, developed an ingenious little box which is to be examined by some of the world's foremost physicists and probably will be acclaimed a marvelous invention, which caused a train weighing about one hundred tons to defy the laws of gravity.

"In a cursory examination of this little box, I discovered to some extent what it was. It is a simple device capable of producing an electrical potential at a given point.

"The box developed an enormous positive potential at the place where it was located. On the train that disappeared, as well as on the train that nearly ended my life, Diaz had managed to secrete a similar box. The train also developed an enormous positive potential. At this point, my friends, I know you are going to squirm and say: 'He can't hand us that and expect us to swallow it. Diaz didn't drive the train off the Earth with an electrical charge!' No, Diaz did not, nor did his box. In spite of the enormous potential, the train that disappeared was *lifted* scarcely twenty feet.

"It is true that like electrical charges repel and if the proper apparatus could be developed that repelling force would

be enormous. But man-made machines are not one hundred percent efficient.*

"Naturally, there would be leakage. But Diaz in his first experiment did not attempt to toss a one-hundred-ton train off the face of the Earth. As a revolutionist, he sought only to wreck the train. He chose his scientific invention to do the job.

"Diaz buried his box in the right of way. The box was attached to a power line and set to work generating a positive potential for its immediate vicinity. Another generator on the train, undoubtedly driven by the wheels of the car to which it was attached, was creating another positive potential.

"The train passed over the spot where the box was buried. Diaz saw and heard what he thought was an explosion and the train disappeared. A crater, apparently left by the explosion, was all that remained. Years later a Kansas farmer finds a coupling pin from the missing train, incased in a meteorite.

"DIAZ did not know of the coupling pin. He studied over what happened. He worked for years, believing he had developed a super explosive, perhaps a sort of death ray capable of turning steel to dust. Such an invention would make its inventor all powerful. He deserted his revolutionary companions and worked alone—a world dominion was his objective.

"After years of effort he constructed a large number of the boxes and through his position as secretary to Minister Cordova, he managed to have one attached to each locomotive——"

"He told me, he was experimenting!" explained Cordova.

*Dr. Walleck suggests that if he is doubted, the doubters should read the article "Magnetism, Terrestrial," in the latest edition of the *Encyclopædia Britannica*, in which it is said that if the positive and negative electricity in a cubic centimeter of the Earth were separated and concentrated at two points, one centimeter apart, the two would attract each other with the force of 100,000,000,000,000,000,000 tons. Dr. Walleck suggests that the repelling "force" would be the same if the charges were the same.

"It speaks well for the progressive spirit of your nation, that you allow experimenting," complimented Dr. Walleck. "But to continue, Diaz decided that his first move would be to lay down a siege of Aruntas. With the Bamborro capital in his power, he planned to move on to other fields.

"The arrival of McDonald and myself in Bamborro, was a severe blow to his plans. He wanted no investigators. As a part of his mad plan, he captured us, tied us to the rails on either side of his box. One thing he overlooked: where he had buried the box the first time, this time he left it above the surface. The box sent out horizontal rays, which prevented the train from approaching."

"The second train did not disappear because it did not reach the point directly above the box before receiving the full strength of the repellent blast. The ground around the box the first time, cut down the force of the electrical potential.

"The force striking the first train hit it with crushing force and it was flicked like a caterpillar into the air. The box was moving with the Earth and the rising of the train necessarily would have to be in directly the opposite direction. If the train had moved parallel to the Earth it would have settled back down, after being tossed a few feet in the air."

"You say, the train soared away?" asked McDonald.

"Yes, it soared away," Dr. Walleck began, writing a series of figures on the blackboard. "The train, going east shortly after midnight at a time near the solstice, December 21, 1925, was traveling at a speed, we shall say approximately sixty miles per hour. The duration of the repellent action, or the time in which the forces acted upon each other, was approximately one second, perhaps shorter, perhaps longer.

"During that second or so, the Earth revolved on its axis and the spot on the equator at which the blast occurred,

moved east at a speed of 1,037.66 miles per hour.

"During that same second, the Earth swung about in its orbit at a speed of 18.5 miles per second. The Sun and its planets, including the Earth, moved through space toward Vega at a speed of about 6.5 miles per second. At that time, December 21, 1925, these speeds were in the same direction."

Dr. Walleck wrote the speeds on the blackboard:

Earth, rotation.....	288 m. p. sec.
Earth, orbit.....	18.5 m. p. sec.
Solar system.....	6.5 m. p. sec.
Total	25.288 m. p. sec.

"The explosion, lasting approximately one second, ordinarily would have lifted the train about twenty feet. But during that second the Earth moved out from under it, leaving the train 25 miles in the air!

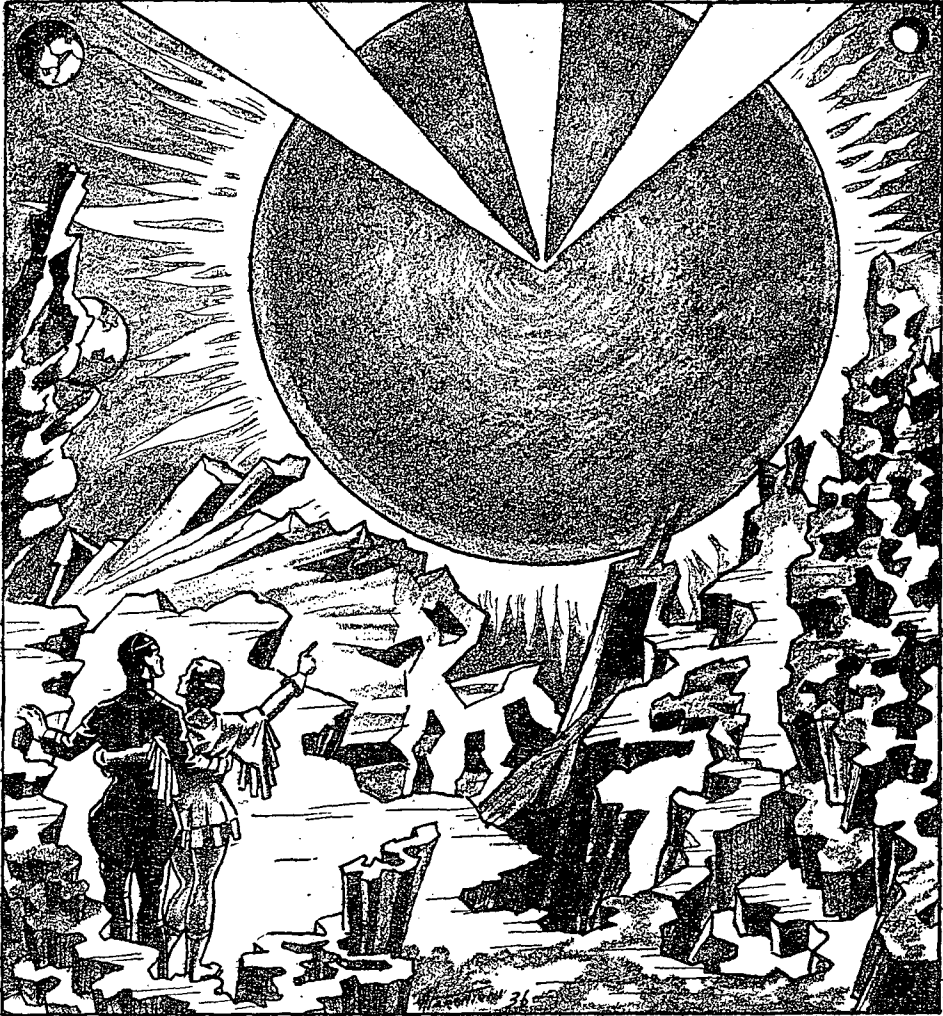
"You must remember that the train moved directly opposite of the motion taken by the box, which was buried in the Earth.

"The speed of 25 miles per second, however, was not sufficient to clear the Earth, if it lasted only one second. But it was equivalent of blocking the force of gravity. Now the train is forced to catch up with the Earth, whirling away at an enormous speed. The acceleration of the train is not sufficient to catch up and the train becomes a free meteor!"

"But, señor," asked Cordova, "you mentioned an explosion?"

"There was not an explosion, exactly. The force was sufficient to give an appearance of an explosion. Here, gentlemen, we have the supreme example of laziness. The train and the box repelling each other were subject to an enormous recoil. The train is lifted off the Earth, while the box is flattened like a pancake and driven into the ground. Each followed the path of least resistance!"

The COMETEERS PART THREE



They were like three glowing, purple wires stretched from World to Sun.

Continuing the epic sequel to the "Legion of Space."

**by Jack
Williamson**

UP TO NOW:

A cloud of shining green, a mysterious "comet" appears out of interstellar space. It is controlled like a ship and its occupants are called Cometeers.

Invisible, the Cometeers learn of Stephen Orco—the legion's most dangerous prisoner, who has learned the secret of AKKA, a powerful weapon which can destroy a whole universe and can be rendered useless only when two masters of it use it at the same time.

Aladoree Star is the keeper of AKKA. Her son, Bob, is brought to Neptune by Jay Kalam, commander of the "Invincible" and of the legion of space, as the only person who can save the universe by killing the rebel.

In an attempt to kill him, he sees a vision of a beautiful girl trying to encourage him. But Bob is unable to kill any man because of a wound inflicted by Orco.

A green light floods the room and Bob loses consciousness.

When he awakens the prison is only a hole in the ground and every one is gone except Giles Habibula and Hal Samdu, his two guards. They have been left alone, thousands of miles from help or the necessities of life.

A space ship suddenly drops, battered, to the ground. It is the "Invincible"! Jay Kalam had gone in it to determine the purpose of the Cometeers—and found they were enemies. But Aladoree cannot destroy them, for Orco has escaped and he, too, possesses the secret of AKKA.

With Jay Kalam, who is still alive, they search for a possible escape. They find another wrecked ship, the "Halcyon Bird," which is not beyond repair, and take it—with its one remaining inhabitant, a half-crazy man—to escape.

As they near the comet, they encounter a powerful repulsive field; something invades the ship, leaves them in a coma, and eats the life from the man they have brought along.

Giles is the only one who sees the thing. He describes it as a thing of moving fire, which can pass through walls, as through a door.

The man from the "Halcyon Bird" dies. It is as though the Cometeer—for such it must surely be—had absorbed this man's humanity within himself.

"I think," is the commander's faint whisper, "that they have come to our system for food." And then Bob gasps, breathlessly, "Asteroid ahead!"

XVI.

BOB STAR'S FINGERS swept to the rocket firing keys. The Halcyon Bird trembled to thundering exhausts. Blue torrents of flame flooded the dark void ahead.

His eye was fixed to a telescope.

"An asteroid?" repeated the tall commander. His grave tones failed to conceal amazement. "You're certain?"

"I am," said Bob Star swiftly, without turning. "The gravity detector showed the mass dead ahead—millions of tons. The deflector fields wouldn't swing it an inch. But I've changed our course with the rockets—I think enough——"

"An asteroid?" Jay Kalam said again, slowly. "The tidal theories of cosmogony have led to the prediction of tiny trans-Plutonian bodies on the fringes of the system. But I don't believe one has ever been discovered. And we're a billion miles outside of Pluto's orbit so——"

At the telescope, Bob Star had sharply caught his breath.

"I see it," he cried. "It's still far off, and safely to the left——"

His voice faded away, and his body grew tense behind the telescope.

Jay Kalam waited for a little time, anxiety pulling at his grave face.

"What is it?" he asked at last. "What do you see?"

"The thing is only a tiny, irregular rock, commander," Bob Star said at last, slowly. "Probably no more than half a mile in diameter. But I believe"—suppressed excitement crept into his voice—"I believe it's inhabited!"

"Bob!" protested the tall commander. "That's impossible, almost. When it's so remote—uncharted——"

"The light diffusion," Bob Star insisted, still without looking away from the telescope, "indicates an atmosphere. And so small a body couldn't hold an

atmosphere, without an artificial gravity field. I'm sure——"

"Planetary engineering is expensive, Bob," Jay Kalam said. "Especially when the equipment would have to be brought so far. It would have been nearly impossible for any one to develop such a remote asteroid secretly——"

Bob Star was still busy with the telescope.

"There!" he whispered. "I have it again, with a higher power."

He looked around suddenly, his lean face shining with wonder and excitement.

"It is! It is inhabited, commander! I see vegetation. It has been landscaped! And there's a building——"

He had thrust his face back to the ocular.

"A long, white building!" he repeated. "There's a ship lying beside it—a small geodesic cruiser. And there's an ultra-wave tower on the little hill behind it."

Jay Kalam's hand closed hard on his shoulder.

Tense-voiced, eager, he asked swiftly: "Can you land there, Bob?"

"Land?" echoed Bob Star.

He turned from the telescope to other instruments.

"I don't know. Our relative velocity is very high; and, of course, we have no geodynes. We might do it with the rockets alone—if there's fuel enough to——"

He was furiously busy reading instruments, setting up results on the mechanical calculator.

"We must do it, if we can," Jay Kalam said, urgently. "For we're helpless, on this wreck. If we can land, we should be able to secure the use of the ship you saw. Or, at least, to signal some legion base for aid, with the ultra-wave."

"It's a chance, Bob, for us to find means to continue the fight against Stephen Orco. A slender one, perhaps—I don't know what possible course of

action remains, since it seems out of the question for a ship to pass the barrier of repulsion about the comet.

"But we must keep trying——"

INTENT over his instruments, Bob Star had seemed hardly to hear. At last he read the final integration from the calculator, and turned swiftly to the rocket fuel gauges.

Anxiously, Jay Kalam asked: "What do you find?"

"It can be done," Bob Star told him, quietly. "There will be just about enough fuel left to fry an egg. We won't be able to leave the asteroid again—unless we get the other ship, or at least a new supply of rocket fuel."

"Then," Jay Kalam said, "do it."

Bob Star called into the power-room telephone. And again the rockets thundered response to the firing keys.

"I'll find Hal Samdu," the commander said, "and send him back into the proton gun turret. And you keep alert, Bob."

"You think——"

"I think we are very unlikely to meet a friendly reception, Bob. Honest folk are not apt to frequent a secret refuge a billion miles outside the system. Frankly, the place puzzles me, Bob."

"The most obvious supposition, of course, is that it is a resort of criminals. But it is singularly remote from any possible scene of operations, for ordinary crime. Pirates could hardly find it a convenient rendezvous. Nor could there be much profit in running synthetic drugs as *chinsa* or *tar-lu* from here to the cities of Earth and Venus."

"I don't know what to expect—except hostility."

And even in that the tall commander of the legion was disappointed. Bob Star scanned the minute world alertly, as the *Halcyon Bird* dropped upon it with rockets flaming blue; and Hal Samdu waited at his great proton needle.

But no warning came from the ultra-wave tower. No hidden proton guns

stabbed out. No stir of motion greeted the descending stranger. The tiny white spindle of the geodesic cruiser lay motionless upon the rocket field, beside the enigmatic quiet of the long white building.

The *Halcyon Bird* came at last to rest upon the level gravel of the little field, beside that other ship.

"Well!" said Bob Star, and laughed uneasily, pointing at a gauge that read zero.

Jay Kalam was peering through the observation ports, with a puzzled shadow on his dark face.

"Queer," he whispered, "that our arrival doesn't create some commotion. Strange ships don't ground here every day."

BOB STAR looked out, beside him. Beyond the slim, silver length of the motionless ship, he could see the white walls and pillars of the building. It was a vast, rambling structure, and every gleaming surface reflected expensive, artistic simplicity.

Below it, a tiny artificial lake burned like flake of pale silver, under the purple darkness of the star-pierced sky. And all about slumbered the silent, exotic beauty of the landscaped grounds. The surface of the little world was irregular, hardly even approximating a sphere. It was a maze of pinnacles, cliffs, ravines, chasms. Pale grass and rank, livid woodland covered the more level slopes. Many-hued lichens splashed the projecting rocks with green, scarlet, and gold.

A slow smile of bemused admiration was creeping over Jay Kalam's thin, dark face. His eyes were shining.

"Why, it's a fairyland," he whispered softly. "A dream!"

He turned his eyes from one strange vista to another, drinking in the peaceful, haunting beauty of glowing rock masses that slumbered under the dark sky, the gay laughter of shimmering

gardens, the cool smile of the silvery lake, and the simple welcome of the long white house.

Beside him, Bob Star felt a strange, painful joy stealing into his heart. Every vivid, lichen-crust rock called to him with a limpid voice of enchantment. The whole tiny planet reached out to him alluring, soothing arms of magic. They rocked his spirit in a cradle of peace. The rest of the system seemed abruptly very remote. And he knew that it would be very hard to go away.

"Can't you feel it, Bob?" Jay Kalam was whispering again. "Can't you feel the hand of a genius, in the balance and the rhythm and the pattern of every contour of rock, of every shrub and bit of grass? Can't you hear an artist singing, in the line and mass and color of it?"

"This world is haunted, Bob, if anything ever was. Haunted by the spirit of the man who made it! It calls to you from every vista—with joy or peace or laughter or pain—or sometimes with terror, where the rocks are wild and dark, and those pale, livid trees are twisted like monstrous dwarfs.

"And it seems to be a dead world. Its maker is dead, Bob," he said, with a low-voiced, half-absent conviction. "He's dead, and his spirit is trying to call to us, from the beauty he created."

Abruptly he shook his head.

"Anyhow," he said briskly, "I had that feeling, somehow. But we've no time to be talking nonsense, Bob. We must be finding out what's wrong, here—why everything is so still—and seeing if we can get possession of that ship.

"We'll leave Hal on guard with the proton gun." His grave voice reflected trouble. "For something is wrong, here, Bob—strangely wrong."

Cautiously alert, gripping proton needles, Bob Star, with Jay Kalam and Giles Habibula, descended from the air lock of the *Halcyon Bird*. The synthetic atmosphere of the tiny world was

fresh and cool, sparkling with the fragrance of the gardens. An uncanny silence haunted it.

Quickly, they crossed the bare gravel of the rocket field, toward the other ship. No name was painted on its tapering silver sides. It was small, Bob Star observed, but new in design, modern, swift—patterned after the latest geodesic cruisers of the legion.

"A good ship," Jay Kalam said. "And her valves sealed, her ports closed, as if she were ready for flight."

"Ah, so," muttered Giles Habibula, in a feeble, apprehensive tone. His small eyes were darting this way and that, with a furtive, nervous quickness. His seamed yellow face was pale; his gross bulk was trembling. He contrived to walk so that he was between Bob Star and the commander.

"Ah, so," he repeated. "But she isn't!"

His heavy arm was pointing at a dark, oily patch upon the gravel, beside the ship.

"The drain valves to her fuel tanks have been opened," he said. "Her precious fuel has all run out to waste upon the gravel."

"That's so," said Jay Kalam, under his breath.

Giles Habibula shivered.

"Mortal me!" he exclaimed. "I don't like this stillness, Jay. The place is too fearful silent. Ah, some dreadful hand has touched this little world, Jay. A dreadful touch! 'Tis dead, Jay. Dead! And no longer a fit dwelling for the living!"

THEY had come to the sealed entrance valve.

"It's locked, Giles," Jay Kalam said. "Will you please open it?"

"Ah, so, Jay," agreed the old man. "But 'tis nothing good we'll find within. The ache in my poor old bones tells me so. We'll find nothing but the ghastly stain of frightful evil!"

He fumbled in his big pockets for a scrap of wire, and waddled heavily to the lock.

Bob Star looked about, anxiously. Silence was sawing at his nerves.

The long white house stood behind them. It was largely built, he saw, of native stone. But its white, inviting luxury had been expensively finished with metal, glass, and tropical woods imported from the distant system. Its materials represented the peril and the cost of many a voyage of billions of miles. —

Its dark windows stared at him vacantly. A depressing spirit of empty desolation came out of it, and touched his soul with a cold chill of dread.

"While we wait, Bob"—it was the quiet voice of Jay Kalam—"will you go look at the equipment in the ultra-wave station?"

"Yes, sir."

"See if the transmitter is in working order. And see if the automatic printers have been taking down any news casts from the system. It would take days for any two-way communication from this distance. But perhaps we can learn how the system is faring against the invaders."

He saluted and hastened away across the tiny field, and up the rugged little hill where the spidery height of the tower stood. Eerie stillness dogged him. It was hard to keep from looking back, from running.

He pushed open a swinging door, and entered the tiny, rock-walled room beneath the tower. And horror thrust him back, quivering, ashen-faced. He thrust out his arms to fend away the ghastly thing that had lurked in the silent chamber.

He saw at once that every piece of equipment in the room was useless. The receivers were dead. The printers were silent. The transmitter had been wrecked, as cleverly and completely as the geodynes of the *Halcyon Bird*.

Every wire had been cut into many pieces. Every tube had been destroyed. The plates of every condenser were twisted, strangely corroded.

But the silent horror was shrieking at him from what lay on the floor.

It had been a man. There were scattered garments. And a little pile of gray, ashlike dust shimmered with pale, unpleasant colors. There was a dark stain on the floor, where some liquid had run away from it.

The equipment, Bob Star knew at once, had been destroyed by the same manner of being that had wrecked Giles Habibula's beloved generators. And the operator had died in the same ambiguous way as Mark Lardo. The Cometeers had been here before him.

HE SHUT THE DOOR upon the brooding thing within the room, and went shakily back down the little hill, to the rocket field. Jay Kalam and Giles Habibula were still standing beneath the sealed entrance valve, and he told the commander in a hushed voice what he had found.

Then: "You can't open it, Giles?" he asked.

"Ah, me," the old man complained, wearily shaking his round, bald head. "Have you never any faith in the blessed genius of Giles Habibula? He could have opened it in a moment, lad. He was but waiting for you to come back with your proton guns. Old Giles is too mortal old, lad, to be recklessly loosing upon himself such frightful evil as is locked within the ship——"

He touched the lock again, and humming motors lowered the valve. Side by side, Bob Star and Jay Kalam mounted it, to push forward against the arms of silent menace.

On the deck within they found crumpled garments, piled with gray and iridescent ash, in the midst of a dark stain, where some strange fluid had run.

They kept far back, and did not speak.

"Giles," Jay Kalam said, "see if the geodynes are ruined."

"But come with me," blurted the old man. "Old Giles is no mortal fool, to go blundering off alone——"

They went down into the power room.

Another heap of weirdly shining ash stopped them at the door. Giles Habibula peered with small, apprehensive eyes at the gleaming, compact bulks of the generators, and sorrowfully shook his head.

"Murdered!" he wheezed. "The blessed things have been destroyed, like our own. This ship is as useless as the *Halcyon Bird*."

They returned to the deck.

The commander nodded, gravely rubbing at his long jaw.

"If we search," he said, "we may find some clue as to who they were, and why such expense was lavished on this secret refuge——"

His slender fingers were twisted together, as if with sudden agony. A dark shadow of pain crossed his lean face.

"That's all that's left for us to do," he said bitterly. "To play detective! For we're marooned here, without any way to depart or to call for aid. There's nothing we can do——"

"Nothing," Bob Star whispered, through teeth grimly set. "Nothing but sit here, while Stephen Orco hunts down my mother, to murder her——"

XVII.

FOR A TIME they stood in silence, upon the silent deck of the murdered ship. Beside them lay the gray, eerily glowing heap that once had been a man. A black despair had chained them to it.

Jay Kalam abruptly lifted his shoulders.

"Still," he said, in a hard, ringing voice, "we mustn't give up. No matter how utterly dark the outlook is, we must

keep on. We must let reason decide what course offers us the best chance—if it is only one in a million. And then we must follow that course, no matter how useless our feelings say it is."

Bob Star nodded doggedly.

"That's so," he muttered. "If it were only our own lives, we might give way to despair. But when it's the life of the whole system——" He broke short, biting his lip. "But," he demanded bitterly, "what can we do?"

The commander was stroking his jaw again, with one long finger.

"The only thing I see," he said, "is to explore the asteroid as thoroughly as we can, and learn as much as we can about the men who lived here. There's the faintest possibility that we can uncover some resource.

"We might begin," he finished, "by a search of this ship. There might be documents——"

They found eleven more piles of glowing dust, on board, where men had died.

Two were in the small bridge room. Bob Star examined the log. The positions recorded in it revealed that the ship had made many voyages to Pluto, the equatorial colonies of Neptune, and certain of the smaller asteroids, outside the orbit of Mars. But it contained no hint as to the nature of her business, or the identity of her owners.

Jay Kalam made a more interesting and perplexing discovery.

He came from one of the cabins, carrying a ring and a little black book.

"These," he said, "I found in the dust where a man died, in there. He may have been the owner of the ship; his suite was the choice one, and very elaborately furnished. A puzzling discovery. I don't know what to make of it."

He extended the objects, for Bob Star's examination. The ring was plain gold. It had a broad black set.

Deeply inscribed in the set, in scarlet, were the outlines of crossed bones, and, above them, a looped tau cross.

The same remarkable symbol was stamped in red upon the black cover of the book. Its thin pages, Bob Star saw, were covered with penned hieroglyphs, meaningless to him.

"It's a diary, I imagine," said Jay Kalam, in answer to his baffled frown. "For the difference in the color of the ink seems to show many brief entries, made at different times. It's written in shorthand, apparently; perhaps a private system."

"Then if we could read it," said Bob Star, "it might tell all about the place."

"I'm going to try," Jay Kalam said. "I've had some experience with cyphers.

"But this is the riddle," he said, "not the diary."

"Why——" began Bob Star.

"You remember, Bob," he said in a troubled tone, "I told you how Stephen Orco's foster parents found him as an infant, adrift in space beyond Mars, sealed in a magnelithium cylinder?"

Bob Star nodded eagerly, puzzled.

"Well," the commander went on, "that cylinder was sealed with masses of black wax. And each seal bore the scarlet impression of this same strange device: the crossed bones that represent death, and the *crux ansata*, above them, that is the ancient symbol of life.

"There's some connection, Bob," he said solemnly, "between the dead master of this place, and the man we must kill! If we can find what it is, it may point the way to action."

THEY went next to the great, rambling, white-walled house, and mounted to the broad veranda. Bob Star stepped shakily over the spectral, sinister lights of a pile of grayish ash, beside a dark, spreading stain and a discharged proton gun. Hopefully, he hammered upon a great door of wrought silver, which bore, upon a tiny black panel, the

crossed bones of death and the looped cross of life.

Silence let them in, to the austere welcome of brooding death.

Exploring the lofty, dimly lighted halls, and the vast magnificence of deserted rooms, they were astounded again and again at the evidence of lavish luxury. One glimpse into the immense kitchen almost banished the apprehensions of Giles Habibula.

"Ah, lad!" he cried, his seamed yellow face shining. "Here's blessed abundance! Whoever he may have been, the dead master of this place knew the secret of life. Ah, no finer array of victuals and of wines could be gathered from the whole blessed system!

"We need live no longer in that mortal coffin of a wreck, Jay—save the one of us on guard. Life knows how long we may be marooned upon this gloomy rock. Forever, it seems mortal likely. We may as well dine and drink with——"

His voice ended with a startled gasp, as they came again upon the shining ash of a man.

In another vast, long, dim room, they came upon a great library of magnificently printed volumes. The lofty walls were hung with the work of famous painters. Niches were set with fine sculpture. An alcove held a fine optophone and many thousands of records.

It sent Jay Kalam into a glow of quiet, suppressed enthusiasm.

"This was a secret kingdom," he said softly. "It was a great mind's dream of paradise, transmuted into reality by some extraordinary power of accomplishment. His strange, artistic genius is reflected everywhere: in the beauty that sings from the gardens, in the architecture of this building, its furnishings, this library——"

"Ah, so, Jay," put in Giles Habibula. "And don't forget kitchen and cellar."

"A true artist," the commander went on, gently. "The supreme creator—his

mark is everywhere." He was staring around with a baffled frown. "And his genius included a gift for anonymity: we haven't found a letter, a photograph, a memorandum—not even a monogram. Nothing save the symbol on the ring and the book.

"There is a connection between this place and Stephen Orco," Jay Kalam repeated. "Find it, and we may find a way to move against him. A slender chance, I know—but the only one we have. We must search out every secret of the asteroid."

Jay Kalam had returned to the *Halcyon Bird*, to attempt to wrest the secret from the shorthand diary, when Giles Habibula made another surprising discovery.

BOB STAR and Giles Habibula were traversing the library, when the old man abruptly halted.

"Lad," he said, his voice thin and hollow in the vastness of the dim, lofty room, "there's a hidden passage in the wall of the alcove, yonder."

With a skeptical interest, Bob Star inquired: "How do you know?"

"How do you know, lad," the old legionnaire retorted plaintively, "which way is up and which is down?" He sighed heavily. "'Tis a feeling, lad, a blessed instinct. 'Tis a matter of subconscious observation—a precious aptitude, refined by training.

"Old Giles Habibula was not always in the legion, lad. Before that evil night when a woman betrayed him, he was a free man. And he lived by that genius.

"Men can't hide their treasures from Giles Habibula, lad. For their minds work alike, as their locks do." His thin voice sank confidentially. "When you wish to find something a man has hidden, lad, merely consider the kind of man he is, and the circumstances he was in, and they will point to the hiding place."

"Do you really think," Bob Star inquired doubtfully, "that there's a secret passage here?"

"Think?" echoed the old man, scornfully. "Ah, lad, I know it."

His heavy arm pointed.

"That wall, you see, is thick enough to conceal a narrow passage."

"But I don't! It looks thin enough to——"

"That's because the pillars and hangings are cunningly designed to hide the thickness of it—a clever optical illusion."

He was waddling toward the alcove.

"The entrance," he said, "should be in that odd corner. 'Tis well concealed from the rest of the room, and convenient to the steps within."

His thick, deft, oddly sensitive fingers were rubbing and tapping at the richly polished panels of red Venusian hardwood.

"Ah, so," he said. "Here's the door. The dust, you observe, is broken in the crack."

Bob Star couldn't observe.

"It feels solid," he said. "But if you think it really is a door, I'll break it down."

"Wait, lad!" protested Giles Habibula, indignant. "It might be broken down. But there's no æsthetic satisfaction in the breaking down of doors! 'Tis a crude admission that craftsmanship has failed. The very thought is a twisted blade in the heart of genius, lad."

"The means of opening the door are at hand, we have but to lay our fingers on it. A switch, no doubt, for the mechanism is doubtless electrical. The master of this mortal place," he said slowly, "was an elaborately methodical man." Heavy lids drooped briefly over his small, fishy eyes. "Ah!" he wheezed. "The optophone, of course! Some trick with the dials——"

His thick fingers touched the control panel of the optophone. Bob Star liked to watch their deft swiftness.

"Ah," he whispered, "so!"

SILENTLY, the scarlet panel swung inward, and white lights flashed on beyond.

"Walk ahead, lad," he requested. "And keep your weapons ready. 'Tis possible that some one is yet alive in the hidden space below. And the genius of old Giles Habibula is too precious a thing to waste, in a desperate encounter with proton guns——"

Bob Star walked eagerly ahead, down a narrow, long flight of winding, rock-hewn stairs. He found no living thing below, however. And what he did find merely increased the haunting enigma of the little world.

At the foot of the stairs, cut into the very heart of the asteroid, was an enormous chamber. It contained a biological research laboratory. There was elaborate equipment for the study of living beings: powerful microscopes, radiographic and chemical apparatus, ovens, incubators and vats for growing specimens. There were massive devices beyond Bob Star's grasp. There were tanks of ghastly specimens—most of them human.

The Cometeers, apparently, had found the place as readily as had Giles Habibula. The dust of seven human beings lay shimmering on the floor.

Back aboard the *Halcyon Bird*, Jay Kalam listened to Bob Star's account of the find, with thin lips compressed.

He didn't speak, and Bob Star asked: "Have you deciphered any of the diary?"

Slowly, the commander shook his dark head.

"No," he said. "It's more difficult than I had expected."

And time went by upon the lonely asteroid, each hour a new drop of bitterness in the cup of the four legionnaires. One hope faded, and another. They found no signal apparatus, no spare geodynes, not even an extra drum of rocket fuel. The mystery of the tiny world still evaded them. Jay Kalam reported

no progress with his efforts to read the secret diary.

At last, from the bridge of the helpless *Halcyon Bird*, Bob Star watched Pluto approach the sinister, pallid ellipse of the green comet. For many days it had been hurtling away from its old orbit, drawn resistlessly toward the invader from space. Bob Star watched it touch the green, palely shining surface, and sink within it, like a black marble dropped into a green sea.

"Pluto's gone," he reported to Jay Kalam. "It has been pulled into the comet."

The commander, at his desk, looked up from the black-bound diary and his litter of penciled sheets. His long, dark face was drawn with care, and he spoke in a voice that was low and weary: "Into the comet?" he repeated, flatly. "And the Cometeers will destroy the colonists, as they murdered the men on this asteroid. And some other planet will follow, and another."

His eyes were black and dull with pain.

"They're murdering the system, Bob, as they murdered this little world. And your mother——"

Bob Star's lean hands knotted with agony.

"And there's nothing we can do!" he muttered. "Nothing——"

XVIII

BOB STAR was striding restlessly, alone, through the silent twilight of a vast hall in the brooding desolation of the white mansion. The feeble daylight of the asteroid filtered dimly through lofty clerestory windows. Pallid violet shafts fell upon high walls paneled with black and scarlet. The wide floor was hard white metal. From the entrance, the hall ran three hundred feet before him, a gloomy tunnel of voiceless mystery.

A baffled urge drove him through it,

the gnawing fangs of a frustrated purpose. Every night, upon the asteroid, he could watch the pale, strange oval of the green comet, sliding across the sable sky. Its weird menace was burned into his very soul; he was ever haunted by visions of Stephen Orco, the archtraitor, seeking his mother to murder her.

Yet no action was possible. His roving of the asteroid had become but a purposeless means of filling bitter, hopeless days.

Bob Star stopped abruptly on the metal floor, sharply sucking in his breath. His heart was suddenly racing, with a light, uneven beat. And his eyes stared with incredulous intensity at a scarlet panel on the wall.

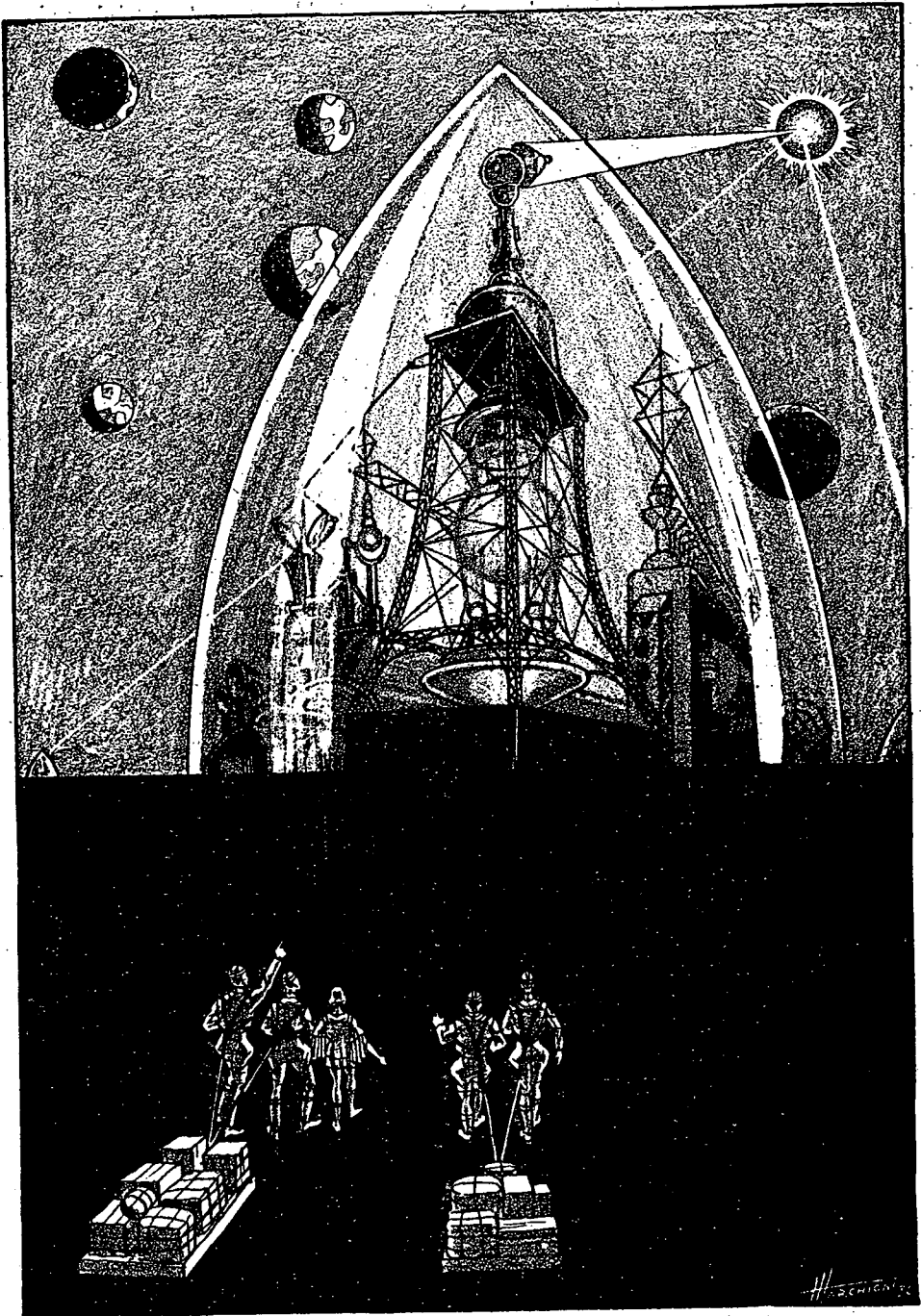
He had seen a vague shadow moving there. And it brought back a shadow and a vision that had come to him in the prison fortress on Neptune, and a face that had never since left his sweet and troubled dreams.

With a rigid, trembling eagerness, he stepped a little toward the flickering shadow. Huskily, his voice whispered, "Come to me again. Please—come to me!"

The lovely image of that white, strange girl had etched itself into his mind. He had yearned to see her again. He had hungered to know that she was no phantom of his tortured mind—as Giles Habibula and Jay Kalam had insisted she must be—but real, living human flesh.

A thousand times he had turned over the amazing riddle of her appearance, without coming on any solution. Still, despite the convincing arguments of Jay Kalam, he half believed that she must be a dweller in the green comet.

And the resolution had hardened in him to solve the mystery of her—after Stephen Orco was dead—and somehow to find her, in the infinitude of space and time, so that he could banish the shadow of trouble from her face.



*"Against that machine, and the masters of it, we're
no more than five flies."*

"Come," he was whispering. "Come back to me!"

The glowing shadows swirled swifter and stronger upon the black-and-scarlet wall. An increasing blue light burned amid them, brighter than the pale shafts that slanted from the high windows.

His heart paused when, abruptly, the shadows rushed together, and sprang into a perfect, burning reality.

It seemed to him as if a strange niche had suddenly been cut in the wall. Its shape was a singular, tapered spiral, like the inside of some ancient shell from the dry seas of Mars. It was black. And it flamed with innumerable lights, from variform crystal runes of blue. A many-angled pedestal of purest sapphire burned supernally at the bottom of it.

Upon the pedestal, as before, stood the girl.

Her beauty brought an ache to Bob Star's throat. She had been lovely in his dreams, until he had feared his dream woman more perfect than the real. But now, when he saw her again, the dream became a forgotten shadow.

Her sweet body glowed white against the darkness and the sapphire flame of the spiral chamber. His first glimpse brought a confused and yet indelible impression of his straight, slim perfection, of the massed midnight of her red-glinting hair, of the pale, tragic oval of her face, and the wide, sad eyes of golden-flecked brown.

It was a moment before he realized that she was hurt.

Then he saw that her long white robe was torn, spotted with scarlet. She swayed upon the vast sapphire. The pallor of pain was on her oval face, and her eyes were deep and dark with agony.

Her face was strained with effort, her slim body was tense. She was fighting desperately against weakness and pain—and against something else. Bob Star sensed a terrific, invisible conflict, in which her mind, her will, was making supreme exertion—

HE STARTED toward her, impulsively driven to her aid.

Two yards from the wall, he checked himself. She wasn't here! She was simply a shadow on the wall. She was no more here than she had been in the prison on Neptune, two billion miles away. Just a shadow—

Or not even that. Perhaps she was mere hallucination, the daughter of a brain that Stephen Orco had half destroyed with his dread omega ray. The red hammer of pain, not still for nine years, still beat behind that scar—and it seemed to him that the blue fire in the fantastic crystals that encrusted the black curves, behind the girl, scintillated in time to its beat.

Had his tortured mind cracked under the agony of defeat and despair?

"Tell me," he whispered imploringly. "Are you real? And where are you? Where are you, so that I can find you and——"

He stopped himself. He couldn't do that. He was growing mad—talking at a shadow on the wall. But, he remembered, before, the shadow had come to warn him. Was this another warning? Was there a new danger?

Then he realized that she hadn't motioned him to keep away, as she had before. Her tragic eyes were on his face, anxious, pleading—and dilated with desperate effort! Reeling on the great sapphire, she held out her arms toward him.

And, abruptly, her image flickered, oddly. It was just, he thought afterward, as if he had been seeing her through a great sheet of some perfectly transparent crystal, and this pellucid barrier had suddenly been snatched away. She had broken through some intangible wall, between them.

Her lips moved, then. He was startled to hear her voice. It was a low, breathless cry—but somehow relieved, glad. Some strange joy washed the pallor and the agony of effort from her

face. Her slim body relaxed, and she fell toward him.

A shadow, falling?

Fighting the numbness of incredulity, he sprang forward. He was faint with utterly astonished delight when the warm, real weight of her came into his arms.

He stood voiceless, dazed, supporting her. He was paralyzed with a fear that somehow she would vanish again, even from his arms.

For a little time she was limp, lifeless. Then brief animation stirred her. She looked back toward the empty chamber, where sapphire flame still shimmered upward from the vacant pedestal against the blue crystals upon the spiral curves of the ebon wall.

A curious call, a single liquid, bell-clear note, came from her lips.

Immediately the sapphire exploded like a great bomb of light. Blue flame filled the niche. It faded to a swirling confusion of shadow. And the shadow died upon the black-and-scarlet wall.

EXHAUSTED, the girl went limp in his arms again.

Bob Star stood for a moment holding her, staring at the wall. "A shadow?" he whispered, "A vision? A dream? Or am I mad?"

He picked her up in his arms, and walked back through the dim length of the silent hall, and across the wide, columned gallery, and out upon the level gravel of the rocket field, to the silvery length of the *Halcyon Bird*.

Giles Habibula met him, below the air lock. He stopped, anxiously watching the seamed, yellow moon face. After all, was she real? Would the old man see her?

The fishy eyes warmed with approval.

"Ah, lad," he murmured, "old Giles is precious glad to see you turn from sickly dreams to reality. 'Tis a good thing for you, lad. Ah, and she's a

blessed lovely lass! Tell me, lad, isn't she fairer than your vision?"

Bob Star laughed joyously, and squeezed the girl in his arms.

"No," he told the old man, smiling. "Because she is the vision."

Staring, Giles Habibula wheezed: "Where did she come from, lad?"

"Out of the wall," Bob Star told him, and laughed at his baffled doubt.

The thick lips hung open for a moment, then Giles Habibula caught himself. "Lad," he announced, "Jay wants you! He just sent me to find you, and ask you to come at once to the bridge."

"Why?"

"I don't know, lad—save that he has found some cause for mortal alarm."

Bob Star, after a moment's wonder, said: "I'll come. But first I must find a place for her."

There were vacant cabins aboard the *Halcyon Bird*, and Giles Habibula waddled ahead to open a door and spread fresh covers on a bunk for the girl.

"What ails the precious lass?" he wheezed. "Is she much injured?"

"I think not," Bob Star told him, easing the dark head to the pillow. "I hope not——"

"There's blood on her clothing."

"Her shoulder's scratched. It doesn't look serious. But she's been through some terrible ordeal. She seems worn out, completely exhausted, and frightened——"

The girl had seemed unconscious. But the golden eyes fluttered open as Bob Star's arms drew away from her. Her oval face was strained again, anxious. She struggled to sit up, clutching urgently at his arm.

He tried to make her lie back.

"Don't worry, kid," he told her, smiling. "Just take it easy. Everything's all right. You just——"

Her voice interrupted him. It was low, strained and husky with weary effort.

Bob Star shook his head. Even in her

forced, tired voice he could sense the liquid beauty of her language. But it was completely strange to him. He caught not one familiar word—nor had he expected to.

But the anxious girl turned to Giles Habibula, as if puzzled, even disconcerted, by his lack of comprehension.

The old man cocked his yellow head, listening to her low, swift speech, jerky with desperate exertion. At last he heaved a melancholy sigh.

"Ah, lass," he said heavily, "your voice is precious sweet! And 'tis evident you have something to say you think mortal important. But"—and he shook his head sadly—"your tongue is one old Giles never heard before."

Still fighting a dead weariness, the girl turned back to Bob Star. Her weary, liquid voice ran on, raggedly. Her white face was a mutely urgent appeal.

"I'm sorry, kid," he said. "But we can't understand. When you're rested, we'll find some way——"

Her fingers closed on his arm, with a convulsive, desperate strength. Her voice went louder, higher, and sobs were breaking in it. Tears of baffled frustration glittered in her golden eyes.

"What could she be trying to say?" Bob Star muttered. "It must be important. When she came before, it was to warn me about the Cometeers——"

Her fingers relaxed from his arm. She slipped back to the bunk again, breathing heavily.

"Poor, brave kid," he whispered. "She's out again——"

"Ah, so," said Giles Habibula. "She was staggering under a mortal burden of weariness and care, lad. 'Tis rest she needs, and sleep. But I wish we could have understood her message!"

"This cut on her shoulder?" said Bob Star, apprehensively. "It can't be serious?"

"Ah, no, lad. 'Tis but a scratch. Rest and sleep will soon repair her strength.

Old Giles will dress her little wound, lad, and watch her; his old hands have yet a certain skill. And you must go on to the bridge."

Bob star started. "I'd forgotten," he said.

JAY KALAM turned from the instruments, at Bob Star's entrance. His dark face wore the grave, abstracted little smile that Bob Star knew to mean severe stress.

"Bob," he said immediately, in a low voice which yet betrayed a suppressed anxiety, "will you please check the orbital motion of the asteroid, and our motion with respect to the green comet?"

"Yes, sir." With a reluctant glance back toward the door, Bob Star went hastily to the instruments. He turned from them at last, with an expression of startled incredulity.

"From your face, Bob," said the commander, with a grave little smile, "I believe your results check with mine."

"My observations show," Bob Star said dazedly, "that the asteroid is moving out toward the comet!"

Jay Kalam nodded, with his imperturbable composure.

"They check," he said. "I was almost unwilling to trust my own results. The asteroid is meshed in a tube field of force, Bob. We are to be drawn into the comet, as Pluto was!"

XIX.

THE COMET lay close ahead of the plunging asteroid.

To watch the last sunset, Kay Nymidee had scrambled with Bob Star's aid to the top of a high, bare pinnacle, beyond the rocket field. They were sitting, side by side, on a cushion of scarlet moss. Their feet dangled over a precipice.

Beneath lay the irregular, convex

surface of the tiny world, molded by the dead genius of its mysterious master into vistas of fantastic, haunting beauty. Slopes of pale-emerald grass smiled with peace, and bright masses of flowering woodland laughed joyously. But above them, everywhere, rugged peaks and ridges loomed solemnly, gorgeously strange in lichen coats of green and gold and scarlet.

And the purple blackness of the sky was a vault of never-fathomed mystery. Its burning myriad of stars were never dimmed or clouded. Day might illuminate the face of the asteroid, but never its sky.

Now the sun was setting, at the backs of Bob Star and the solemn-eyed girl, a point of blue-white splendor, attended by the tiny flecks of Jupiter and Saturn. It cast black, knife-sharp shadows of the two upon the sheer, lichen-crust ed opposite wall of the gorge.

Before them, above black shadows and flaming lichens, the comet was rising—for the last time. The ellipse of it came up like a featureless mask of hideous green, peering malevolently over the edge of the tiny world. Its leering face was near, now, huge.

Bob Star caught the girl's hand; Kay Nymidee clung to him with an instinctive grasp.

"*Temyo ist nokee*," she murmured, shivering, in her own strange tongue. Her voice was deep and husky with dread.

"Yes, sweetheart," he whispered. "I suppose we'll soon be inside the comet. But there's nothing we can do——" He checked himself, and forced a smile. "But don't you worry, darling——"

Nearly a week had passed since the girl's amazing arrival on the asteroid; and now she seemed almost recovered from whatever trying ordeal had preceded her advent. The scratch on her shoulder was healed; for three days she had been able to leave her cabin; her fair skin was glowing again with health.

Through their efforts at communication, Bob Star had learned her name—Kay Nymidee. He had learned that her home had been, indeed, in the comet. He had found that she hated and feared the Cometeers—whom she called *aythrin*.

And that was about all.

She had appeared disappointed and bewildered by the failure of the legionnaires to understand her strange language. And she had tried, desperately, to learn their own tongue. Bob Star had pointed out objects, to teach her nouns, had illustrated the meanings of simple verbs. He had found her a brilliant and eager student; she could already make a good many simple, concrete statements. But anything more abstract than the greenness of grass or the sweetness of wine was still a heart-breaking impossibility.

Bob Star glanced at her, and again her breath-taking beauty held his admiring eyes. The sinking, distant sun, catching her head from behind, filled the mass of her dark hair with living gleams of red. Her face was a wide oval of white beauty, though now the green rays of the comet had overcast it with a look of strange foreboding.

Wide, golden, her eyes were on his face. In the failing light, the pupils were great pools of tragic darkness. They were haunted with consuming sorrow, with an utter despair that he mutely yearned to brush away.

They lighted, when he looked into them, with a wistful golden light. The warmth of a tender smile glowed for a moment on her face.

Bob Star caught her to him, with impulsive fervor.

"Kay," he whispered. "Darling——" A poignant ache grasped his throat, chokingly. "I love you—so much!"

His lips sought for hers. And his eyes were suddenly dim and smarting with tears; a sharp pain stopped his breath.

For a moment the vital warmth of her body yielded, relaxed against his side. Her dark hair brushed his face, soft, fragrant. Her full, parted lips were lifted for an instant, responding.

Then dread stiffened her. Her slender-body jerked away, as if from a cold shock. Her haunted eyes went back to the comet, and her face in its green light was once more terrible with agonized forebodings.

"Mahnyanee"—came her fear-roughened whisper—"Mahnyanee——"

Bob Star released her.

"That's right, kid," he said soberly. "We've no right to think of anything else, so long as Stephen Orco is alive and——"

"Staven Or-rco!"

SHE seemed to clutch at the name, with the desperation of agony. Her urgent voice repeated it, with a curious accent. Her slim arm pointed out, at the fearful, rising face of the comet. And then she was talking furiously at Bob Star, in her liquidly beautiful, incomprehensible tongue.

He shook his head, muttering: "It's no use, kid."

Her voice rose higher. She made frantic gestures, at him; toward the argent spindle of the *Halcyon Bird* behind them; including the entire asteroid. Always her slender arms swept back toward the comet.

"Staven Or-rco!" He caught the name again. And her word for the cometeers: "*Aythrin!*" Both were many times repeated, but there was no other word he understood.

Tears glittered in her eyes. She caught his shoulders, as if to shake him into comprehension. Then she collapsed in his arms, trembling with sobs.

The blue point of the sun had set, and the comet reigned. Its awful face, a vast, sharp-edged sheet of ominous pale-green flame, spanned the dark sky from

horizon to zenith. Visibly, terribly, it grew.

The surface of the asteroid was hideous with its un-Earthly light. The great building was warped into an unreal palace of nightmare. Trees sprawled under it in black masses, like dark monsters crouching. The higher, barren rocks glittered beneath it like fantastic spires of ice.

The *Halcyon Bird* had become a green ghost ship, when Bob Star and the girl came stumbling back to it. The others were waiting outside the air lock, staring in awe-struck apprehension at the fearful sky. They looked ghastly, spectral. The terrible radiance had turned their flesh vividly pale; their faces were masks of uncanny horror.

There was to Bob Star something grotesquely incongruous in the scholarly calm of Jay Kalam's voice, speaking quietly to Giles Habibula.

"Obviously," he was saying, "the Cometeers are able to generate and control a force analogous to what we know as gravitation. We have an inkling of the possibilities, from the theory of the geodyne, and from the principle of our own gravity cells.

"Apparently, however, they are able to set up directional or tube-fields, that are in effect beams of force. They are instantaneous, and their power doesn't fall off appreciably with distance. And evidently they carry almost illimitable energy; for they dragged Pluto out of the system as readily as they pulled the *Invincible* off her course.

"Probably the ships of the Cometeers are moved by the reaction of such invisible beams, acting against planets or other massive bodies. And no doubt the propulsion of the entire comet is accomplished in the same way, by reaction against the mass of the universe.

"The repulsion which, before, drove the *Halcyon Bird* back from the surface of the comet, is probably a variation of the same force."

"Ah, so, Jay," murmured the old man, when he paused.

But the livid, ghastly moon face of Giles Habibula was lifted toward the fearful flood of green flame swallowing the sky; and he gave no other sign of having heard.

"Such feats," Jay Kalam's even voice went on, "must require tremendous power. They must have some source a thousand times more efficient even than our atomic power tubes——"

HIS VOICE fell away into a chasm of breathless silence.

With appalling speed, now, the green edges of the comet were rushing outward. They were like green curtains dropping toward every horizon.

Bob Star had to swallow, to find his voice. It sounded harsh and rasping in the dreadful silence. It made Giles Habibula start and moan.

He asked Jay Kalam: "Shall we go aboard?"

"The rest of you may, if you wish," said the commander. "The ship is helpless; I don't know that it would be safer. I don't know what the danger is. I don't know what will happen when we strike the wall of the comet."

"But I'm going to stay out here on the field, so that I can see it better."

Bob Star caught Kay Nymidee's arm, and drew her a little toward the air lock. But she shook her head, and looked up at the expanding sea of the comet.

Abruptly, Bob Star had the unpleasant sensation that the asteroid was falling, with their bodies beneath—falling into a tremendous green abyss. The pale, sharp edges of it rushed down to the horizon, and the whole sky was a dome of flaming green.

He heard Jay Kalam whisper: "We're about to strike it!"

A thin, agonized wail quavered from the lips of Giles Habibula. "Mortal me!" he gasped. "What will happen?"

Bob Star put his arms around Kay

Nymidee, moved her a little into the shelter of the shining ship. What would happen? Would there be an impact? A hurricane of wind? Would the radiation harm them?

He waited, breathless. He could feel the quick beat of the girl's heart against his side. There was an odd little flicker in the green vault of the sky.

But nothing happened. Waiting became unendurable. Shakily, he whispered: "When, commander? When will we strike?"

He heard Jay Kalam draw a deep, even breath.

"We've passed the shell of green," he heard the commander's calm voice. "We're already inside the comet."

Trembling, he gasped: "Already?"

"Look at the sky," said the quiet voice, "and you will see."

XX.

BOB STAR walked unsteadily beside Kay Nymidee, away from the hull of the *Halcyon Bird*. His bewildered eyes swept the sky. It was still green, an inverted bowl of pale, weird-hued flame. But it was swarming, now, with strange celestial bodies.

His startled glance darted from one to another.

They were mottled disks, like dark moons, strung across the green. They were of various sizes, variously colored, patched with a thousand merging shades of red, orange, yellow, brown, gray, white, black. All were flooded with sinister green.

They were clustered planets, crowding the green sky! The patches were continental outlines. The vast areas of green, he thought, must be seas, reflecting the green of the sky.

"A sun!" Jay Kalam was breathing, voiceless with amazement. "A sun within the comet!"

And following his steady, pointing arm, Bob Star saw a great ball of purple

flame. Its hot color was fantastically strange, against the green. It was huge; it looked three times the size of the system's sun, as seen from his home on Phobos.

Kay Nymidee had stepped quickly a little away from him. Her slender white arm, trembling, was pointing at one of the swarming dark planets, which hung well above the horizon. Unlike the others, it was not mottled. It presented an unflawed disk of indigo.

Between that vast indigo planet, and the globe of the purple sun, Bob Star saw three tiny lines of purple, parallel and close together. They were like three glowing, purple wires stretched from world to sun.

"Bob! Jay! Hal! Giles!"

The girl was calling them all by their names, softly accented. And still she was pointing at that colossal, featureless world of violet-blue.

"*Aythrin*!" she cried urgently. "Staven Or-rco!"

She ran to touch the bright, green-glinting hull of the *Halcyon Bird*, and then gestured as if it had risen toward the indigo world.

"Staven Or-rco!" she repeated, and ground her small hands together, as if obliterating something.

"See!" exclaimed Bob Star, eagerly. "She wants us to go to that blue planet! Stephen Orco is there, with the Cometeers—she calls them *Aythrin*. She wants us to go there, and kill him."

The girl had watched him as he spoke, brown eyes shining.

Now she seized his arm, speaking at him furiously in her own language. She nodded, shook her head, shrugged, made faces, gesticulated.

Bob Star put his hands on her shoulders, to try to calm her. "It's no use, kid," he said. "We can't understand. And we can't fly the *Halcyon Bird*, if that's what you want—"

"She has something more than that to tell us," said the commander. "I wonder if she could draw it?"

He found writing materials in his pockets, and thrust them into her hands. She grasped them eagerly, when he demonstrated their use. She drew a circle, and pointed at the great indigo planet. Then she made some drawing within the circle, and held out the paper, talking rapidly again.

"The circle means the planet," Bob Star said. "But the marking inside—"

He had to shake his head, as the others did.

And tears of frustration came suddenly into the girl's eyes. She flung the paper down, with an angry, bewildered gesture, and burst into stormy tears, overcome by the manifest impossibility of her task.

Jay Kalam shook his dark head, regretfully.

"It's too bad," he said slowly. "I'm willing to grant, now, Bob, that she's a native of the comet—although her humanity seems contrary to orthodox science. And I believe that she has some very important information about the Cometeers and Stephen Orco.

"But communication seems impossible. Without any common background of languages or culture, or even of thought forms, it would take her months, brilliant as she evidently is, to learn enough English to convey any complex or abstract ideas."

He turned abruptly, and peered briefly up at the vast purple sun.

"We must go aboard, Bob," he said, "and take what observations we can. We must discover as much as we can about the comet—and about what is happening to us."

An odd little hush came into his voice.

"I think," he went on, "that we won't have much time for observations, Bob."

"Why?"

"I believe that the asteroid is plunging on, toward that purple sun."

AST-9

FOR A TIME, within the little bridge room, they worked for the most part silently, except for whispered exclamations. Bob Star was speechless with the ever-renewed impact of the comet's supernal wonder. It was Jay Kalam, still gravely collected, who began to put their discoveries into words.

"The comet," he began quietly, "is a swarm of planets. We've counted one hundred and forty-three. Since we entered on the forward side of the asteroid, we must have seen them nearly all. We knew already, from its perturbations of the system, that the comet's mass is approximately a thousand times that of Earth. The purple sun accounts for rather less than a fifth of it. The average mass of the planets, then, must be over five times that of Earth.

"These planets have been built into a ship. The green shell is the hull—an armor of repulsive force. The planets are arranged inside of it, spaced about a great ellipsoid——"

Bob Star nodded, and then said: "They are. But I don't see how such a system could be stable. Such great masses, so closely crowded. What keeps them from collision, or from falling into the purple sun?"

"They must be held in place with etheric tube fields—with beams of force forming a stable network," said Jay Kalam. "Those invisible beams are the frame of the ship.

"The purple sun," he went on, speaking slowly, with a half-absent deliberation, as if merely to clarify his own conception of the comet's amazing nature,—"the purple sun is at one focus of the ellipse. And the great indigo planet which so interested the girl is at the other——"

"Just look at it!" Tense-voiced, Bob Star spoke from the ocular of a telescope.

"What do you see, Bob?"

"The surface of it is absolutely smooth, like dark-blue armor," Bob

Star told him. "And there're machines scattered over it. They're far apart. And they must be enormous, to be visible at this distance——"

"Machines? What kind?"

"They're too vast and complicated to describe. They must be miles high. Mostly built of something red. Towers, and moving shapes—disks and beams. Great balanced tubes, like telescope barrels, only they're too long and thin.

"Over each one, there's a kind of shimmering dome of green, that you can just see——"

His voice fell off, with a little gasp.

Jay Kalam waited a moment, rubbing at his dark jaw, and then asked: "What now?"

"You can see those three shining lines?" Bob Star asked, with poorly repressed excitement. "Like three wires stretched between the planet and the purple sun?"

"Yes?"

"Well, I've found them. And they're great, shining beams. They come from the three biggest machines I've seen, spaced at the corners of a triangle. Three purple rays, shooting out toward the purple sun——"

"I see!" said Jay Kalam softly. "I believe I see it, now."

BOB STAR turned reluctantly away from the telescope, rubbing at his eyes.

"Yes, commander?"

"The purple sun is not a real sun, like ours," said Jay Kalam. "Our Sun has three hundred times the mass of the entire comet. That purple sun is far smaller than Jupiter.

"Its color, as well as its size, marks it off from natural luminaries. Its light, you recall, is almost monochromatic; it radiates no appreciable heat.

"What it is, Bob, is an atomic power generator. It is one more creation of the science of the Cometeers—the power room of the comet ship!

"That triple beam is the conduit that

taps its power, and conveys it to the blue planet. And the blue planet must be the engine room and the bridge of the ship. The power from the purple sun must be distributed through the other machines you saw, to generate the etheric tube fields of force that maintain the organization of the comet and drive it through space."

"And then," Bob Star whispered, "that sun—it's merely a fuel tank for the comet?"

"It must be, Bob. A fuel tank. And a furnace where matter is annihilated, to liberate fluid energy. It isn't a natural sun. Atoms break down to supply the energy of natural suns. But that normal process must be too slow to supply the prodigious demands of the Cometeers. They must consume matter at a terrific rate, when the comet is driving through space at speeds even beyond that of light itself.

"And the fuel must be replenished."

Bob Star looked at him, and his face went a little white. His hands clenched. "So that's why!" he gasped. "That's why I couldn't recognize Pluto among these planets?"

Jay Kalam nodded, his dark eyes sober.

"It's a week," he said, "since we saw Pluto drawn into the comet. The Cometeers must have already stripped it of life—of everything they valued—and flung it into the purple sun!"

He was silent for a little time. His long, dark face was haggard, drawn, and rigid as a mask of death. And the voice that came from the thin lips was low, harsh, almost sepulchral.

"That seems to complete our picture of the Cometeers. They are universal marauders. They rove space from sun to sun. They pillage planets, and feed their vampire lives upon the living things they find. And they seize the planets themselves, to build into the comet swarm, or to burn in their purple sun, for fuel——"

Bob Star was yet staring at him, his lean face whiter still.

"Then," he whispered blankly, "the asteroid's flight toward the purple sun will not be stopped?"

The head behind that rigid, graven mask shook slightly.

"I think not," said Jay Kalam, solemnly. "The Cometeers have already once raided the asteroid. Probably they have no farther interest in it, except as a speck of fuel."

Absently, he was stroking again at his jaw. He asked presently, very softly: "How long have we, Bob?"

Bob Star remained standing for a moment in a dark reverie; he started nervously, and said, "Yes, sir!" and turned to busy himself hastily with telescope, calculator, and chronometer.

He straightened at last, shakily, and wiped sweat from his white forehead, with his hand.

"Three hours," he whispered, huskily. "In three hours, commander, we will plunge into the purple sun."

XXI.

JAY KALAM closed the door of the little bridge room with a weary finality. For a moment he leaned heavily against it. Then, walking with tired, dragging feet, he followed Bob Star down the metal length of the little covered deck, and out through the small cylinder of the open air lock.

Kay Nymidee, Hal Samdu and Giles Habibula were still outside, on the gravel of the little rocket field beside the long white house. They were ghostlike, uncanny, in the pallid-green radiance that shone from all the sky.

Hal Samdu's gaunt, gigantic figure was standing bolt upright. His great, gnarled hands were clenching and opening again, convulsively. His shaggy head was flung back, and his blue eyes were fixed upon the indigo disk of the

master planet. His rugged face was grimly savage.

"If Stephen Orco is there"—his voice was rumbling, harsh—"we must go—some way—and kill him! For Aladoree can——"

Giles Habibula and Kay Nymidee were sitting together on the gravel. The girl was marking little diagrams with her finger, on the ground, and talking swiftly to the old man. He was patiently listening, wearily shaking his yellow head.

"Old Giles is sorry, lass," he was saying gently. "But 'tis no use——"

They all looked up when Jay Kalam and Bob Star came down from the valve.

"Well, Jay?" boomed Hal Samdu. "Now we are within the comet, with Stephen Orco. How shall we move to kill him?"

Jay Kalam stepped back a little, wearily, to lean against the bright, green-washed hull of the *Halcyon Bird*. His dark eyes closed for a moment, and his long face, in that un-Earthly light, was a stiff mask of pain. "Still, Hal," he said slowly, "there's nothing we can do."

He looked at Giles Habibula and the girl, with weary pity.

"In three hours," he said, "the asteroid will fall into that purple sun. And we have no means to depart. We must perish, with it!"

Hal Samdu's massive face twitched to a spasm of pain. Brokenly, he gasped a name: "Aladoree——"

Giles Habibula surged apprehensively to his feet. The globe of his little head rolled back, his small eyes peered fearfully at the purple sun, burning huge in the weirdly green sky.

"Mortal me!" he gasped convulsively. "But three blessed hours, Jay?" He swung toward the sagging figure of the tall commander; his thin voice grew pleading. "For life's sake, Jay, can't you give us more than that? Old Giles isn't ready to die——"

His small, tearful eyes rested for a moment beseechingly upon the stiff mask of Jay Kalam's face. Then he shook his head.

"Ah, me!" he moaned. "'Tis an evil way to die—burned alive in a mortal purple sun, within a comet! Ah, the ingratitude of man! That an aged, wounded legionnaire should be so rewarded, for his years of faithful service to the blessed system!"

He blinked the tears out of his dull eyes.

"Ah"—he choked—"death—death! Is old Giles so feeble he must yield to death? Must the eternal fire of his precious genius be extinguished, now?"

Trembling, he blew his nose.

"Wine," he whispered. "There's wine in the house. Precious, potent, ancient wine, that can lure death himself to sleep!"

A curious, vague smile came over the yellow moon of his scarred face. He turned heavily and lumbered, with a weary, rolling gait, toward the great white mansion. And Bob Star, listening, caught the faintly whistled notes of a once-popular ditty of the legion: *The Sparrow of the Moon*.

HAL SAMDU was still standing rigid, with his blue eyes burning toward the dark circle of the indigo planet. The muscles of his rugged, weather-beaten face were working; he was muttering inaudibly.

The commander's tall body still sagged against the hull of the *Halcyon Bird*, as if the life had gone out of it.

Bob Star turned to Kay Nymidee, who was looking from him to the disk of the purple sun, with apprehensive bewilderment.

"Come on, Kay," he said huskily, "let's walk."

She smiled. "Se," she said softly. "Walk." That was a word she had learned.

They crossed the level of the rocket

field, and climbed up into a welter of rocks beyond. They were wild and fantastic as the spires of a fairy city, under the green sky. The encrusting lichens had changed color strangely, so that they were splashed with eldritch hues.

Bob Star made her sit beside him on a mossy ledge. His arms closed around her slender loveliness. Bitter in his heart was the thought that, inside the space of hours, all the beauty and the sweetness and the mystic wonder of her should have been consumed within the purple sun.

And the thing began to seem incredible, so that he desired to laugh, and forget it as a dreadful dream. For his poignant love for Kay Nymidee seemed too strong, too vital, to be destroyed; it was a flaming power that could not die.

But the girl was trembling, staring away into the green sky, her eyes great pools of somber dread.

And the fragility of their love, of all human values and even of human existence, came to him appallingly. Their situation, he saw, epitomized that of all humanity. They were lost, bewildered, helplessly riding a dead world to doom.

And the great human realities, the joy and pain of love, the sweetness of companionship, justice and compassion, the desire of life itself—they were feeble armor against the dread lords of the comet; against invisible fleets, and the power that had dissolved the system's strongest fortress into vanishing red fire, and instrumentalities that tore very worlds from their orbits; against the horror of the Cometeers themselves, invincible, shining beings, superior to matter, feasting hideously upon humans.

Vainly, Bob Star tried to push that bewilderment, that horrified despair, out of his mind. He drew Kay Nymidee close to him, and tried to banish the haunting dread from her face. He tried to think only of her white beauty—

THEN Giles Habibula was beneath them among the rocks, panting, excited. "Come, lad! Come!" he puffed. "The dalliance of love is the food and drink of youth, I know. But it must await a time less torn with mortal urgency. Come!"

"What is it, Giles?" asked Bob Star, dully. For nothing mattered.

"Jay bids you come and aid us to load the *Halcyon Bird* with rocket fuel."

"Rocket fuel!" exclaimed Bob Star, dazedly. "But there isn't any."

"But there is! Jay bids you hasten."

Bob Star helped the girl down from the ledge, and followed Giles Habibula. A slow, incredulous joy was breaking in him. He demanded: "Where did he find it?"

The old man shook the bald dome of his head, which shone greenish in the light of the comet.

"Ah, lad," he lamented, "ever the same is the fate of genius: it stumbles unknown into an unmarked grave. 'Twas not Jay that found the precious rocket fuel, lad. 'Twas I—poor old Giles Habibula. But you give him no credit." He blew his nose, tearfully.

Bob Star asked, eagerly: "How did you find it?"

"Poor old Giles had started to seek wine with which to dull the fearful fangs of death. But, beneath this mortal green sky, his aged spirit, weak and feeble as it is, rebelled against extinction.

"Ah, so! Giles Habibula's blessed genius awoke to the shocking touch of peril, and refused to be destroyed. It recalled Jay's belief that rocket fuel must be upon the asteroid, hidden away against possible raiders of space. It recalled the nature of the dead master of the asteroid.

"Ah, and it set his old finger upon the hiding place."

They were crossing the rocket field. The old man's fat arm pointed toward the switch box, built in the wall of the

white house, from which were controlled the floodlights beside the field.

"Old Giles simply walked to that box, lad, and opened it. There is a deftness that lingers in his old hands, lad. And he found the secret of the box that would have evaded any other.

"And there's the fuel for the blessed rockets, lad!"

They came around the green-bathed hull of the *Halcyon Bird*. And there, a dozen yards from her air lock, a little cylindrical metal house had risen through the gravel. Hal Samdu was rolling black drums of rocket fuel from the door of it.

Bob Star ran to aid him.

It was more than two hours later when Bob Star, with the tall commander and anxious Kay Nymidee, hurried into the tiny bridge room of the *Halcyon Bird*.

Urgently, the girl pointed through an observation port, at the great indigo disk of the master planet.

"Aythrin!" her soft voice cried eagerly. "Staven Or-rco! We go?"

And Jay Kalam asked gravely, "Can we?"

"I don't know," Bob Star told them, briefly.

He called to Giles Habibula, through the power-room telephone. His fingers touched the firing keys. And once more the rockets awoke to thundering life. Their blue flame washed the gravel field, roared against the white columns of the deserted mansion.

THE *Halcyon Bird* leaped free again, and away into the green void of the comet. The asteroid plunged away behind them. It was a little dark fleck, against the now huge and ominous face of the purple sun. It dwindled, vanished.

Bob Star felt a pang of regret at its destruction. For it was in the cradle of its haunting, exotic beauty that he had come to know Kay Nymidee. His

love for her had spread, somehow, to its laughing groves and the wild splendor of its lichen-painted rocks and the peace of the long white house above the smiling lake.

He thought with distress that the silent mystery that dwelt there now could never be solved. The anonymity of its dead master was now forever secure. The design of the secret world's creation, the purpose of the hidden laboratory, the meaning of that strange emblem of looped cross and crossed bones, the connection—if connection there was—between the asteroid and Stephen Orco—these all were riddles now unanswerable.

Jay Kalam had long since announced abandonment of his efforts to read the secret diary.

"Impossible," he had said, through lips strangely tight.

"Have we fuel enough," the commander asked again, "to reach the master planet?"

"I'll see," Bob Star said. And he added: "We could have stayed to load no more. Or we should have been caught, too, in the gravitation of the purple sun. As it is, it's taking half our fuel to check our fall and get clear."

The rocket motors still were thundering as he read fuel gauges, took repeated telescopic observations of purple sun and indigo world and of a dozen other dark planets hung within the green.

"I believe," he said at last, "that it can be done. But there'll be no fuel left to maneuver, or to come away again. And——"

His voice stopped, as red telltales flamed and gongs clamored at him.

Puzzled, startled, he swung back to the instruments.

"It's the triple beam!" he reported, apprehensively. "The flaming purple rays between the planet and the sun. There's an etheric vortex about them. A suction——"

He paused to call again to Giles Habibula, to change the course of the *Halcyon Bird*. Worry creased his lean brow.

"We can keep free," he said. "But it costs fuel." He bit his lip and whispered, "We may land too hard for comfort."

Stern-faced, abstracted, he turned again to instruments and calculators, fighting a silent battle to conserve every precious drop of fuel.

IN HOURS, perhaps, the flight was long. But it seemed to Bob Star that they had hardly left the asteroid before the *Halcyon Bird* was slanting down out of a pallidly green sky that swarmed with many-colored worlds, toward the dark, strangely even surface of the indigo planet.

The master planet seemed a perfect sphere of violet-blue, unbroken by mountain or sea. It appeared absolutely featureless, save for the overwhelmingly colossal machines, red and mysterious beneath their domes of shimmering green radiance, that scattered it at distances of hundreds or thousands of miles.

As that dark, strangely forbidding surface expanded before them, Kay Nymidee had pointed through an observation port at the looming bulk of one of those machines.

"Go," she said eagerly, and groped for a word, "there!"

Bob Star nodded, and set the nose of the *Halcyon Bird* toward it. Then he looked doubtfully at a fuel gauge.

"I'll try," he whispered grimly.

But the needles crept inexorably toward zero. The even drumming of the rockets was interrupted by a warning cough.

He shook his head, and brought the *Halcyon Bird* to a jarring landing upon the strange flatness of the indigo world, with rockets dead before the ship was still.

"The tanks are empty," he muttered. "The ship won't move again."

Kay Nymidee seized his shoulder, and pointed imploringly at the crimson, Cyclopean mass of the machine ahead, a bewildering and fantastic enigma of red metal, within its transparent shell of flashing green.

He shook his head again.

"Sorry, kid. I couldn't do it."

The mute reproach in her brown eyes changed slowly to frightened dismay.

"Perhaps we can walk, if we aren't discovered," Jay Kalam suggested gravely. "Kay seems determined to take us to the machine. And it doesn't look so far——"

"The distance is deceptive," Bob Star informed him, wearily, "because of the vast size of the planet, and the remarkable clearness of the atmosphere, and the lack of any other object for comparison."

"How far is it?"

Bob Star looked at his instruments.

"According to my last observation," he said, "that machine is more than a hundred and twenty miles away."

XXII.

THE hostile impact of an alien world struck the five with shocking violence, when they left the air lock of the useless *Halcyon Bird*.

It was five hours later. They had spent the time in preparing to undertake a desperate march of more than a hundred miles. Bob Star and Hal Samdu were dragging two sledges improvised from metal doors torn from within the ship, packed with food, water, and weapons.

The runners sang musically across the flat infinity of the planet's surface. It was darkly shimmering, a rich violet-blue. It was absolutely smooth, as if from a high polish. Nowhere, so far as they could see, was it broken by any irregularity.

At first they found it oddly difficult to walk upon it; Giles Habibula slipped twice, and sprawled ludicrously. As a compensatory advantage, however, the sledges, once started, glided along almost without effort.

"A whole world, armored?" marveled Bob Star. "Is it metal——"

Jay Kalam shook his dark head. "I made some examination of it," he said. "It isn't metal. It is harder than diamond; it was not affected by any test that I had time to make. Probably it is matter of no sort that we know—but another and more perdurable construct of vibratory energy, made possible by the high science of the Cometeers."

He had been busy for an hour, in the little laboratory, before the air lock was opened.

"The atmosphere is adequate," he had reported. "The low pressure—ten pounds—is made up for by a high oxygen content. There is a relative wealth of inert gases. The air is remarkably pure, completely dust-free."

"The gravitation is four per cent less than Earth standard, although the planet has nearly four times Earth's diameter. That means that its density must be relatively very low."

"Then," Bob Star asked, "we can safely leave the ship, without space armor?"

The commander nodded.

"And we must go ahead, on foot, and try to reach that machine. That seems the only thing——"

Bob Star's face set, bitterly.

"And that's a forlorn hope," he muttered. "We're so helpless! So ignorant even of what we must try to do. Think of it, commander! We are only five, one of us an old man, one a girl. And we've come with little more than our bare hands, to fight against a science that drives a swarm of worlds through space like a ship!"

"But we must fight," Jay Kalam said gravely. "It is our duty to man——"

At a little distance from the *Halcyon Bird*, Jay Kalam paused, and they all looked back. The trim, argent hull of it lay small and lonely upon the jewel-smooth plain of dark indigo. It was the only object upon the infinite world behind, a solitary gleam under the pale-green vault of the sky.

Blue flame, as they looked, gushed suddenly from the turret which had housed the great proton gun. The bright hull glowed swiftly red, and sagged. A little streamer of smoke drifted away from it. Slowly it began to cool.

The five went on, regretful, for it had been a faithful ship.

"Perhaps," Jay Kalam said, "when they find it, they will think that it fell, and we all died in it."

They plodded on, over the level of violet-blue, wearily dragging the sledges. It was a blank infinity that reached out to the titanic riddle of the machine, a hundred miles away. The machine was the only thing that broke the straight line of the strange horizon where indigo met green.

Bob Star's eyes rested upon that monstrous mechanism, with a dull, apathetic fascination. There was a square platform of some dead-black stuff. It might be, he estimated vaguely, two miles high and ten in length. The machine towered above it, so vast that he dared not attempt to guess its height.

The thing was of some blood-red substance, that shone like metal. There was a lofty frame of colossal beams and girders. There were moving parts, so intricate, so strange, that he could find no name or explanation for them. In particular, his eye was caught by a vast, shimmering white object, shaped like a flattened orange, that moved irregularly up and down between two colossal plates of crimson.

And the whole was inclosed in a conoid dome of pallid-green radiance, that seemed somehow akin to the sky.

Despair dropped its leaden mantle on him.

"Against that machine," he muttered, "and the masters of it, we're no more than five flies!"

They plodded on. In the pellucid atmosphere, the machine looked almost near enough to touch. Ever it retreated, mockingly.

At last, at the plaintive insistence of Giles Habibula, they halted. The *Halcyon Bird* was lost to view. They huddled in a lonely little circle by the sledges, on the vastness of the shimmering dark expanse of indigo. They drank. They ate sparingly. They tried to rest their bodies upon the adamant surface.

There was no wind. The cool air was oppressively still. The green sky did not change. There were no clouds.

"The planet doesn't rotate," commented Jay Kalam. "There is no inequality in the radiation. There are no seas. Consequently there is no weather, not even any time. It is a world without change."

A terrible silence hung over them. Nothing lived or moved or gave voice upon all the plain of empty indigo. The world was utterly vacant, save for the overwhelming enigma of the red machine, utterly changeless.

The green sky was equally devoid of life or motion. The vast, cold disk of the purple sun hung steady, high above the straight horizon. They could see the faint, glowing lines of the triple beam, diminishing toward it.

The multitudinous planets of the comet swarm, of various sizes, variously marked and colored, were strung motionless through the void of eternal green. Then neither rotated nor changed position.

Giles Habibula wiped sweat from his yellow brow with the back of his hand.

"Mortal me!" he moaned. "'Tis a fearful world to die in! Ah, Giles! His old bones ache. His feeble limbs

tremble with weariness. His poor feet are blistered until every step is mortal agony. His old eyes are dim with staring into the fearful face of death."

He sighed heavily.

"Ah, me! Upon one journey of forlorn hope, old Giles carried a bottle of wine through the mortal hardship of a continent larger than the blessed Earth. But then he fought enemies he could understand.

"Ah, no. He never felt such need of the bright strength of wine."

He fumbled in the packs on the sledges, and found a bottle of some rare vintage, from the asteroid. Watching with a jealous eye, he presented it to the others in turn, and at last drained it gratefully.

EVEN JAY KALAM was worn to admission of doubt.

"It's true," he said in a low voice, "that we are in a graver situation than even on the Yarkland expedition. For the Medusæ, although able scientists and terrible foes, were conquered refugees from their own environment.

"The Cometeers have conquered theirs!

"The Medusæ we could understand, we could kill. But the Cometeers, while doubtless in a sense material, are not common flesh. They are beyond our understanding. I doubt very much that any weapon men ever made could destroy one of them!"

The others, squatting in the lonely circle amid the empty desolation of the bleak indigo plain, had listened solemnly. This was the commander's first expression of his mounting despair. They all were shaken by it, for his quiet reserve had been a bulwark.

"Ah, so, Jay," croaked Giles Habibula. "Our plight is mortal desperate. In seeking to balk the Cometeers and destroy Stephen Orco, we are like five ants making war on all the system—"

His voice wheezed into silence. His

dull eyes, staring into the green sky, seemed to film.

"Ah, 'tis well!" he sighed at last. "'Tis well we drank the wine."

Bob Star saw a small and distant object, skimming swiftly toward them through the green. It was low over the violet-blue, flat infinity, in the direction of the vanished *Halcyon Bird*.

Jay Kalam caught at Giles Habibula's arm, as he started getting to his feet.

"Don't run," he said. "There's nowhere to go. If we crouch down, perhaps it won't see us."

Bob Star was huddled beside Kay Nymidee. He caught her hand, and it closed upon his with an urgent, desperate pressure. Her face was drawn, terrible with strain. Her skin was nearly bloodless; her pale lips quivered. Naked, overwhelming terror shuddered in her eyes.

Pity for her stabbed him like a blade. His face grimaced with the pain of his desire to shield her. He felt almost as if the doom of the universe was nothing, against the fate of this slender girl.

A nerve-severing sound tore through the quiet. He jumped, startled, terrified. For a moment he could not identify the sound. Then he knew that it had been Giles Habibula's scream.

Now the old man was trembling, sinking slowly backward upon his knees. His moon face was yellow-gray, contorted with dread. His small round eyes were fixed, glazed, bulging.

"What is it, Giles?"

The reply was a hoarse croak of fear. "Mortal me! 'Tis the thing—the shining thing—that ate Mark Lardo—"

Bob Star looked up, then, and perceived that the thing he had seen a moment before, skimming above the far horizon, was already upon them. For the first time, his horror-distended eyes rested upon one of the *Aythya*—the drivers of the comet.

It was hanging in the air, close beside them.

FLOATING low over the jewel-hard indigo plain was a tiny star of red, intensely, painfully brilliant. It was veiled in a misty moon of red. Ten feet above it was a violet star, equally bright, wrapped in violet fog. The red seemed hot as the core of a sun, and the violet as cold as outermost space.

A thick, glowing mist swirled in a spindle-shaped pillar between the moons. It was silver-green, like dust of silver mingled with powdered emeralds. There was life in the motion of it; it was like a throbbing artery of light.

Red star and violet star waxed and waned, beating like hearts of fire.

Girdling the middle of the misty pillar was a wide green ring. It might have been cut from a colossal emerald. It shone with a cool, steady radiance. It was the only part of the thing that looked altogether material, substantial—and even it, Bob Star knew, could pass through the hard alloys of a space cruiser's hull.

His dazed mind first received the thing with startled incredulity. He blinked, and looked down at the dark plain, and rubbed his eyes. But the thing had not gone when he looked again. And its hideous reality ate into his mind, like a corrosive poison.

He recalled Giles Habibula's comparison. It was a magnet turned to living fire, its opposite poles the twin stars, its field the green mist, its magnetism radiant horror.

In vain he strove against that horror. "Just colored lights," he muttered. "Moving mist. Shouldn't be afraid that—"

But mind-killing dread swept into him. His numbed senses perceived a terrible entity within, beyond, those colored lights—an alien being, of supernatural fearful powers. Its very nature was malific. Every atom of his body reacted to it with automatic, shocked revulsion.

And the incessant beat of his old, strange pain, behind the white, ragged scar the omega ray had made, was suddenly redoubled. Every throb of it became a sickening, staggering blow against the naked tissues of his brain.

He braced himself against nausea and confusion. Swiftly, half unconsciously, his fingers had been slipping fresh cells into the two hand proton needles. And the two weapons came up, now, together.

The emerald ring, he thought, must be the most substantial part of the being. And he pointed the needles at that, through a red fog of pain. And he pulled the firing levers all the way, to exhaust the cells in one single blast of flaming destruction.

Those twin, blinding swords of violet ruin would have cut through a solid foot of tempered steel. They would have electrocuted any living being—as the system knew life—at the distance of a mile.

But, like phantom swords, they flashed through the green ring, harmless.

Quivering to the shock of icy dismay, Bob Star recalled Jay Kalam's opinion that men had never made a weapon that could injure the Cometeers. His numbed hands dropped the useless guns. He shrank back, stiff, nerveless, paralyzed. His drawn face was fixed on the shining terror, his eyes wide and glassy with dread. Chill sweat drenched him.

"Kay"—despair rasped from his leathery throat—"Kay——"

HIS VOICE stopped, as if to the touch of death.

For out of the pillar of swirling light another voice had spoken, whose careless, mocking levity was the most

appalling thing Bob Star had ever heard.

"That's rather useless, Bob," it said.

It was the voice of Stephen Orco.

Bob Star staggered backward. That light, ringing voice was more terrible than all the shining horror.

"You had your chance, Bob," said the voice. "When I was in prison on Neptune, you had only to touch a little red button to kill me. But you failed, Bob. You couldn't do it. And I'm afraid you'll never have another."

"For now, Bob, I've a body that cannot be destroyed."

"You"—dread drew Bob Star's tone to a quivering edge—"you're *that*?"

"I am what you see, Bob. One of the masters of the comet."

A low, mocking chuckle rang away from the shining being. There was a little silence, and then the clear, perfect voice spoke out again: "Perhaps, Bob," it suggested lightly, "you would be glad to hear of your mother? It must be some time since you left her."

Bob Star leaned forward, trembling apprehensively. A gloating satisfaction in that careless voice cleft his spine like a cold ax. Hoarsely, from stiff, unwilling lips, he forced the whisper: "Yes?"

"I was alarmed for your mother, Bob"—the liquid mockery of Stephen Orco's voice flowed on—"for she has been lost. My new associates searched the system for her, in vain. And I was frankly worried, for her life is the only barrier before me, now."

"But her discovery has just been reported to me. It appears that your father, on his *Phantom Star*, was taking her away from the system, toward the star 61 Cygni. My associates have captured them. And I hope soon, Bob, for the pleasure of meeting your mother, here within the comet."

To be concluded.

Looking Ahead

Every now and then an eventful fact makes us pause and check back over our efforts and our accomplishments. We ask ourselves how far we have traveled—and in what direction. Are we on the right road? Are we moving ahead?

This issue of the New Astounding Stories achieves the age—under the Street & Smith Banner—that the Old Astounding reached under its former publisher. Page by page and story by story I have checked this issue against the Old. And I know we have progressed. The Old magazine was good—but the New Astounding is better! I can feel it as I hold the two in my hands.

We have launched our space ships on many an undreamed-of trail. We have explored the galaxies. We have built new traditions. And our magazine still forges ahead. We are finding new thought channels to explore every passing month. And we who enjoy Astounding know that the dreams of mankind cannot pass us by!

We see; first with the groping uncertainty of the novice; then with the glimmering vision of the initiate; and finally with the clear, confident eyes of the scientist who is not afraid to dream of what the future holds.

Is it strange, then, that the reading audience of Astounding Stories seems somehow akin? Is it strange that I can sit down and talk as if I know you all? I feel as if we were all members of that inner circle who see and understand a vision that is beyond the ken of the vast multitude. We have something in common, something binding us together—for we see, eye to eye, standing in a solid phalanx, shoulder to shoulder.

An outsider would not understand. He would have to seek this vision and grow for a while to become one of us. He would not understand how I can talk of an intimate circle when I know that every minute, day and night, week in and week out, somebody somewhere is buying a copy of Astounding Stories.

But you can understand because we have looked at the stars so long, together. And you can understand why I have to depend on you to help others get acquainted with our magazine. And you can understand that to progress we must get 2 people buying a copy every minute; and then 3!

And in return I pledge to you that our progress will continue.

The Editor.



Comprehensive Review.

Dear Editor:

Though I have been reading *Astounding* for the last couple of years, on and off, this is my first letter to you. I want to state that *Astounding* is by far the best science-fiction magazine on the market, and is practically perfect as is. When I picked up a copy several weeks ago, I was agreeably surprised to note the smooth edges, which have improved it considerably. However, please forget about semi-monthlies, wire staples, and quarterlies being screamed about by some of the readers. The only "change" I favor is editorial notes on the letters in *Brass Tacks*.

The Roaring Blot was O. K., although nothing to write home about. More of Long, Jr., please. *A Little Green Stone*, *The Drums*, *Pre Vision*, and *Mad Robot* were all fairly good. *Entropy* was super excellent and *Redemption Cair* was close on its heels.

So sorry to hear about Weinbaum's death. He was a swell writer—about the best ever.

At the Mountains of Madness was praised by many but it didn't click with me at all. It dragged horribly and the absence of conversation spoiled it. Why such long discussions about things unfamiliar to most of us? Lovecraft may be good, but that story didn't raise him in my estimation.

The Cometeers: So glad to see Williamson again. He's one swell author. The story starts fairly well but it will have to go some to beat that supreme *Legion of Space*. Now, there was a story!

Mathematica Plus: O. K. as a story, but who wants to believe that he's just the sum of a couple of equations? And how the heck could an adding machine run a space ship by forming equations, etc.?

Doomed by the Planetoid: Swell tale. Well told.

Red Storm on Jupiter: Not bad. Better than *The Roaring Blot*, though.

Elimination: Silly. Went into too much detail for my sub-super scientific intelligence!

The Weapon: Pretty good, especially in practicability.

W62's Last Flight: O. K., but it doesn't explain how the M31 was able to prevent itself

from falling into the sun. At the beginning it was heading toward old Sol at a terrific pace. How was it able to deflect its course?

Spawn of Eternal Thought: One of Binder's best. However, a being of pure thought would be little less than a god, and certainly indestructible by any material weapon. Besides, how could such a being digest planets when he had no material body with which to attempt such a task?

However, *Astounding* is certainly swell. Keep it as it is. I will remain faithful to it. Here's hoping for more swell issues like the last few. —Cameron Lewis, 268 Shepherd Avenue, Kenmore, New York.

Gallun "Improves With Age."

Dear Editor:

I have just laid aside my *Astounding Stories* with regret. I would like to see it out every week, but as such is not the case, I must be satisfied with things as they are. Your magazine needs no praise. It speaks for itself. I have read most of the editions of your magazine since it came out and shall continue to do so as long as it maintains the high standards it has through its previous publication.

Your illustrations leave nothing to chance and if anything, portray a true picture of what the readers can expect in the type of story he is reading. You have three unusually good stories in your April edition, and I think Raymond Z. Gallun should receive the cake for his *Child of the Stars*. It is exceptionally well done and, like wine, the author improves with age. Let's have more of him and No. 775. Eando Binder's *Spawn of Eternal Thought* is a jewel and it "gives one to think," as the Frenchman would say. I am glad to hear that we will see more of his work.

Manley Wade Wellman is new to me. His story is more than acceptable and I hope to see more of his works in the future.

Well, regardless of whether this reaches *Brass Tacks* or not, you will hear from me soon, and you can count on that.—Howard G. Michand, 1093—E 74th Street, Cleveland, Ohio.

More Wiljon Kar?

Dear Editor:

Ah! At last the yearning in my heart has been appeased. Why? Smooth edges at last. Seriously, they do make the magazine look a hundred per cent better. You sure did hand us a surprise.

The death of Weinbaum was sure a shock to all us true-blooded science-fiction fans.

I enjoyed Lovecraft's story, but somehow it didn't seem to click with me. The first two installments make you think it is going to lead up to a breath-taking climax, but it seemed to me that it sort of grizzled out. Why didn't Lovecraft find a whole colony of the plant men or whatever they were supposed to be and tell more specifically what was chasing the two men at the end of the story? Another thing, Brown's illustrations for the story were rotten. They did not follow the events of the story at all.

Well, now that you've had the thorns, here are a few roses for you. The April issue was peachy and so was the May issue. I like *Entropy* very much; it sort of reminded me of *The Einstein Express*. By the way, what has happened to J. George Frederick? Did he die? Am glad that you got a serial by the Binders, Otto and Earl. Why don't you try to get a few illustrations from their brother Jack? Here are three guys who really help imaginative fiction a lot.

I don't like the new series by Kruse. Please continue the series with Wiljon Kar and Prock, Mardico, and the rest of the gang.

Schneeman's inside illustrations for *Mathematica Plus* was sure a grand piece of work. The same goes for Saaty's illustrations and *The W62's Last Flight*. Here are two illustrators who are progressing very rapidly. Hold on to them.

Glad to see Manley Wade Wellman and P. Schuyler Miller back with *Astounding*. The same goes for D. D. Sharp. If it is possible, get a story by Burroughs, will you?—Walter Liebscher, Jr., Mount Olive, Illinois.

The Quarterly Again.

Dear Editor:

I bought good old *Astounding Stories* on Wednesday the fifteenth. The cover is great! Just like all of Brown's covers. Your past issues from the time of the new era (trimmed edges) were all marvelous.

Entropy, *Outlaws on Callisto*, *Child of the Stars*, *Redemption Cairn*, *Mathematica*, and the others were all fine!

In a letter to Brass Tacks once before I asked for some pen pals, and thanks to you, I have six. But there is one I heard from twice and he has just faded away. He was Harry Hyter, R. 1, Covington, Oklahoma; if anybody knows anything about his whereabouts, please let me know. One of the fellows I heard from lives in Africa!

I think I'll put in my two cents' worth of suggestions, too. I don't agree on a bimonthly. There aren't enough authors to cope with a bimonthly and even if there were it would, like all other bimonthlies, soon be out of circulation. I agree on a quarterly on the description of it given by Jack Darrow. I haven't quite made up my mind as to a large size. It would ruin the set that a lot of *Astounding* readers have, if they save them. How about previews of forthcoming stories? Also a biographical sketch and picture of favorite authors?

I wrote this letter to tell you that Lovecraft's *At the Mountains of Madness* was a swell story. Masterfully written. But there was one thing in it I did not like—rather something that was left out. He didn't put any conversation in it except for a few snatches at the beginning. I hope his *The Shadow Out of Time* has some conversation in it. I have also heard his name and the story *The Color Out of Space* and I am inclined to think that he wrote it.—William E. Stokes, 1107 Bingham Street, Pittsburgh, Pennsylvania.

Wesso and Dold Are Back.

Dear Editor:

In the current issue, *Mathematica Plus* stands head and shoulders above the other stories. After reading Pearn's creation, I was in a daze. Paradoxes—wow! But it was an outstanding story and deserves all the appreciation it gets.

I can't say the same for the other complete stories that composed the May issue. *Doomed by the Planetoid* was too hackneyed to suit me. It might have passed as a good yarn in the old days, but it was just a flop to the readers of to-day.

The short stories were also hackneyed and senile in plot. *Red Storm on Jupiter* was the only one I read without stifling a yawn.

In the editorial you state that you secure the best stories from the best authors. I think you secure the worst stories from the best authors. Of course, there are many exceptions.

I would like to answer the readers:

Alan Beerbower: Many more than three A-1 stories have been printed. What about *Rebirth* and *Colossus* and *Colossus Eternal*?

Willis Conover: Your philosophy about Schneeman is all wet. The best story in this issue was illustrated by Schneeman.

To the readers calling Rothman a chronic kicker: Rothman is of the old school. He is doing everything within his power to better and advance science-fiction. He knocks the stories that need knocking and gives praise where it is deserved.

What happened to Wesso? He is missing from the May number. I advise you to get him back pronto.

When are you going to give in to the readers and produce David H. Keller? He and Weinbaum are the only authors who consistently turn out good literature.—Robert A. Madle, 333 East Belgrade Street, Philadelphia, Pennsylvania.

Rocket Plans?

Dear Editor:

Astounding Stories has outstripped any other magazine in the field of science-fiction by trimming the edges of the magazine. But that is not all! The stories are the finest and I enjoy them the most.

I have a few suggestions to make: Why not put in a page of science fact? Couldn't you manage to put in a few plans for rocket ships? Couldn't you put up copies of your best serials into bound-book form?

If you publish this letter, some old fogies who think they know it all, will find some fault with these suggestions. But I want to say that this is an *open forum* for controversial opinion and these are just a few suggestions that probably won't bring any results whatever.

I cannot comment on any of your stories because they are all good. But I do think that if an author writes a story, his science should be accurate to some degree and his ideas and theories have some ground.—Ernest Kay, 617 Dole Avenue, Chicago, Illinois.

One for Binder.

Dear Editor:

Shake E. Binder's hand for me because of the best story that he has ever written. It is *Spawn of Eternal Thought*—a truly gripping story written in the best Binder style. I especially liked his descriptions of the other planets and their moons. He produced a fine character in Renolf, showing a combination of humility and pride. The rest of the stories were all good, especially *Mathematica Plus* which made me dizzy when I finished it. Still waiting for that quarterly.—Lyman Martin, 65 Howe Street, Marlboro, Massachusetts.

What is Science-fiction?

Dear Editor:

May the gods smile on you! A real Williamson story would make any magazine a wow, temporarily at least, and you've been one for some time. At any rate, it's no end fine to meet our old friends again. Williamson is always good—and with his finest characters in this tale—Lord, love you, sir, I'm feeling mellow as seventy-year import.

Mathematica Plus was a fascinating yarn, too. It brings up the old problem, though—what is science-fiction? I should like to see just one definition that would satisfy ninety per cent of the readers. To me, anything dealing with fantasy, except weird fantasy, is science-fiction, and if well written and a plot not too threadbare, I'm for it. Even a touch of weirdness or a threadbare plot may be gilded to prove acceptable reading. I've read glorified adventure, cowboy, and miracle-man stories that were A-1, fictionalized half-baked theories that couldn't be beat, overlaid romance that didn't leave a queasy feeling and even a scientific detective tale I liked. Also, I have read stories of each type that left me doubting my sanity for having read them. Science-fiction, as is used, should be accurate, but as in all other fiction, personal taste and good writings are the factors that determine whether a story is liked or disliked.

Mathematica Plus was not science-fiction at all. It was pseudo mathematics, fiction, and hokum. Its appeal lay in a trick of using grand sounding phrases and vague hints which orators have used to thrill the masses since Greece, but this time they were given a semimathematical form. Analyze most of it, and it means nothing.

Fearn tricks the reader into kidding himself that he is following great ideas and is in touch with something outside the ordinary. Like the old stage magicians, he brings up again those greatest words in any language—"maybe" and "if." He does a good job of it, too, and I enjoy his tricks thoroughly. But a few of that type are enough. Occasionally they are enjoyable, but not as a steady diet. The same applies to psychological stories.

Anyway, you're doing great. Keep it up, and try for that quarterly; I'll certainly have no complaints if you do.—Ramon F. Alvarez-del Rey, 731 Franklin Station, Washington, D. C.

We Can't Have Sequels to Everything.

Dear Editor:

This is my first letter to Brass Tacks, although I have read copies of your magazine intermittently for five years and continuously for the last two.

Now for the cover criticism: For a few months preceding your April issue, your covers were excessively dark. Then when you needed a dark cover (April issue) you made it a light blue. Your May issue cover is very nice, but what is it supposed to represent?

I read and re-read your magazine while waiting for the next issue, so I have formed an opinion as to the best serial. It is *The Mightiest Machine*, by John W. Campbell, Jr. Why not have a sequel to this story? It would be very interesting, I am sure. The next best was *The Legion of Space*, by Williamson. I was glad to see a sequel to it in the May issue; I hope the second is as good as the first. The next is *The Skylark of Valeron*, by E. E. Smith. The story was good, but slightly inferior to the first two.

At the Mountains of Madness was rather dry, although a pretty girl and the appearance of the Elders would have made it an excellent story for a weird magazine.

The Binder brothers, Earl and Otto, are doing very nicely. I hope you continue to get their science-fiction manuscripts. How about a sequel to *Spawn of Eternal Thought* in about six or seven months?

Congratulations on the smooth edges! They certainly do dress up the magazine.—Harold Z. Taylor, 777 Luck Avenue, Zanesville, Ohio.

Now—and Then—100% Up!

Editor, Astounding Stories:

A friend of mine, at present living in America, sent me the September and October issues of your excellent magazine and I must say that they are 100% improvement on the September and October issues of 1933. Keep it up. You're doing fine!

I like stories like *Green Glory*—in fact all stories that deal with insects or with man in the far future. Get Bob Olsen to write a few ant stories for your magazine. I think he is A-1 at this type of story. Is there any truth in the rumor that you are going to turn out a quarterly? If there is, go to it! An annual would not be amiss either. What about it?

When are you going to get a few stories written by Keller? I've not seen one of his in Astounding yet. I would like to communicate with an American interested in science-fiction and exchanging of magazines.—John Gregor, 9 Webbex Street, Norwood, South Australia.

Just a Line—But—

Dear Editor:

Just a line of appreciation for the May issue. *Mathematica Plus* and *The Cometeers* were great. Cover swell, except for a rather odd arrangement of colors.—James N. Mooney, 3556 Vinton Avenue, Palms Station, Los Angeles, California.

Addressed to Mr. Stark.

Dear Editor:

I should like to reply to Mr. Stark: You have propounded a question which should be considered scientifically. Life in the solar system is very probably of the same kind. At this stage only two other planets are capable of supporting life—Mars and Venus. Martians are probably decadent or else they have reverted to the primitive and fight over water. At any rate, they are probably too busy saving themselves to develop culturally. The Venerians have not reached as high a plane of evolution as we Tellurians. They are probably in what corresponds to our carboniferous. For more detailed information, let me refer you to *Spawn of Eternal Thought*, by Messrs. E. and O. Binder.—Alan Aisenstein, 891 Academy Road, Woodmere, New York.

Mathematica Plus—a Puzzle.

Dear Editor:

My second letter to Brass Tacks. So far I have not seen my other one in print. Even though I always read Brass Tacks I cannot remember reading a letter from some one in New Orleans.

I have finished reading the May issue—all except *The Cometeers*, by Jack Williamson, but I never read serials until I have all the parts. *Mathematica Plus* was a kind of puzzle. It seemed all mixed up.

I rate the other stories as follows: *Red Storm on Jupiter*, good. *Doomed by the Planetoid*, I liked. *The Weapon*, I liked. *The W62's Last Flight*, very good. *Elimination*, I didn't like so much.

I think that a sequel to *The Spawn of Eternal Thought* would be fitting.

Astounding Stories is the best science-fiction magazine on the market. I hope you will continue the good work, for good it is.—Hawkins B. Wheeler, 3045 Dumaine Street, New Orleans, Louisiana.

Another First Letter.

Dear Editor:

The April issue of *Astounding Stories* sure was bad, the only redeeming novel being *Spawn of Eternal Thought*. The only fair short story was *The Cosmo Trap*.

A few months ago the late Mr. Weinbaum (I certainly miss him) wrote a swell novel called *The Red Peri*. *Outlaws on Callisto* was practically a direct copy of it.

All the illustrations were good, with the exception of the one for *The White Adventure*. The scientist looks like a broken-down pugilist mixing a highball. I'm fourteen years old and would like this letter published as it's the first one I ever wrote to a magazine. I would like to correspond with some one.—Girard Wilson, 428 East 67th Street, New York City.

A Hint or Two—or Three.

Dear Editor:

I have been a reader of *Astounding Stories* for about a year and a half now and have read a lot of letters by complaining crabs who know less of science than a three-year-old. How the majority of these Hicks can find reasons to yap about *Astounding* is more than I can see. How some of them, after reading stories like *Avalanche* and *Lo!* can complain about things like illustrations, burns me up. The illustrations don't seem so terrible to me; Schneeman isn't bad, and Marchionni is as good as there is. The new May cover is the best ever.

Gallun's *Dereclit* deserves a sequel. A sequel to *Lo!*—or else! A sequel to *Mind Over Matter* and more like it. A department of scientific questions wouldn't hurt *Astounding*. Less "time" stories. They always leave a bad taste in my mouth. Why not a diagram of the inside of a space ship? More stories about M31. If you must have interplanetary, please go into the next galaxy.

I wish that some of these scientific organizations would send me literature concerning it as I am interested in such projects. Wishing you all the luck in the world, and thanking you for the trimmed edges.—Jack Ryan, Jr., 2131 Lake Drive, Grand Rapids, Michigan.

"Technically Wishful."

Dear Editor:

The criterion for entertaining stories of any sort appears to me, and I feel to others, to be the degree to which they attain plausibility exciting continuity from a human basis; but in addition thought-variant stories, as you put it, must call on some "technically wishful" channel of scientific potentiality to be acceptable.

The classic Smith, of Skylark fame, I feel grasped the precise approach to success in this line by recognizing at once which channels were "technically wishful" and in keeping with at least the first law of thermodynamics (if not Newton's third or the Lorentz-Fitzgerald motif).

However few there may be, your authors of *Blue Magic* of *The Adaptive Ultimate* caliber, in contradistinction to Weinbaum, for instance, would do as well to establish these criteria as would the author accepting their work. Power to you!—Brackett Selan, Cambridge, Massachusetts.

The Reason Why.

Dear Editor:

This may start a debate or something of the sort but if our worthy critic, Mr. Francis L. Ellissen, would have investigated before he condemned Mr. R. L. Harder for asserting that lightning strikes upward, I wouldn't be writing this letter repudiating his condemnation.

Lightning does strike upward, though not always. When a rain cloud forms, the particles of water in it rub against each other rapidly and form static electricity. This may be either positive or negative. When there are enough of these charges present, opposite charges are attracted from the earth. This movement of electrons or protons, as the case may be, becomes so rapid that the air in the immediate vicinity becomes heated to incandescence. This streak of light is what we term lightning. So lightning does strike upwards.

Sometime, however, this action takes place between two clouds which contain opposite charges. If Mr. Ellissen reads this (and I hope he does), I can prove my point by writing to any good physicist and he will confirm my statement. I am sure Mr. Harder is not "cracked." In my opinion he is quite learned since most people do not know that lightning does strike upward.

Your trimmed edges place *Astounding* above other magazines. However, I have a kick to make. Your story *Mathematica Plus* is very baffling and more far fetched since we know that nothing can be truly destroyed but only changed in shape or state.—Cassius Peacock, 1925 Cordova Street, Los Angeles, California.

Including Another New Idea.

Dear Editor:

I have always considered you to be the perfect editor. Your acceptance of *At the Mountains of Madness* makes me all the more sure of my decision. It's the quality of story that those who rave of the "good old days" are looking for. *At the Mountains of Madness* is a story that can be read and re-read with greater enjoyment at each reading. Plenty of material for a sequel. I'm glad to know that another Lovecraft story is on schedule soon.

The shorts in the April issue were dandy. It's about time you acquired P. Schuyler Miller! *The Chrysalis* was a peach.

Raymond Z. Gallun is always welcome. One author that can always be depended upon to turn out something worth reading. None of the sequels, however, have come up to *Old Faithful*.

Manley Wade Wellman turned out an interesting adventurous tale. He can do better, though.

When sequels are published, I think it would be a good idea to not only name the original story but also the issue in which it appeared. Another thing you can do is to name the artist of each story so that we can tell who did the illustrating when they don't sign their work. Please don't have the story title half over the illustration and half over the first page of the story. Doesn't look neat. I prefer it all over the first page of the story.

Brown's inside work is improving. I wish I didn't have to ask for Paul all the time. I suppose you wish I wouldn't.—Jack Darrow, 3847 North Francisco Avenue, Chicago, Illinois.

"Good-natured Growling."

Dear Editor:

I think your idea for scientific discussion in Brass Tacks is all right. But as Robert Lee Hanna said, good-natured growling, not the bitterness that accompanied the discussion of the law of conservation of energy.

Now for the stories, first prize goes to *Child of the Stars*. *Spawn of Eternal Thought* gets second and *Outlaws on Callisto* gets third. Among the short stories, *White Adventure* was the best. The other two were good. As I haven't finished *At the Mountains of Madness* yet, I can't give you my opinion of it.

Keep your present editorial policy. I think it's better than a science editorial.

You may not agree with me but I think the five best stories of 1935 were: *Earth Minus*, *Islands of the Sun*, *Earth's Mausoleum*, and *Set Your Course by the Stars*.

As to my favorite authors, they are: Gallun, Binder, Williamson, Fearn, and Weinbaum. It was too bad about Weinbaum's death. If he had lived he would have become the greatest science-fiction writer.—Frank Capadona, 1512 Wieland Street, Chicago, Illinois.

Does Science Eliminate Women?

Dear Editor:

First, of all, why do you mess up your pages with stories like *The Chrysalis* or *White Adventure*? Mr. Miller and Mr. Long may be good writers, but their plots are not so good. *Strange City* and *The Isotope Men* were very good.

By the way, won't you please stop the love stories and have a little science-fiction? My idea of a good story is *The Spawn of Eternal Thought* or *The Cosmo Trap*. *A Child of the Stars* was fairly good. And bring up some good serials some time. *Blue Magic* and *At the Mountains of Madness* were rather fantastic or maybe I just didn't understand them. In *The White Adventure* why did the radio announcer suddenly stop speaking?

The trimmed edges make the magazine look better but I'm afraid you might change the price to twenty-five cents. However, even if this did happen, I believe people would still buy it. I know I would.—Bill Streiff, 4606 East Central, Wichita, Kansas.

War Themes Are O. K. But Done Too Often.

Dear Editor:

I am very happy to notice—and I'm sure all of us are—the stand that you have taken against war themes. If the title of a story even remotely suggests a war between two nations or peoples, I will not read it. I like to read stories where the two unlike nations are working together for some common good—perhaps against the failings of nature.

Also, I see where some readers are clamoring for Hawk Carse again. Do you think Hawk Carse belongs in Astounding Stories? The only claim that kind of a story has to Astounding Stories is a ray gun and a rocket ship, and that is not very much. Give me, O Editor, thought-variants instead of Hawk Carse and the I. S. P., etc.

May your authors all find new ideas, and may you publish two thought-variants each month—one in each of the semimonthly issues which the future holds in store for us—I fervently hope.—Donn Brazier, 3169 North 41st Street, Milwaukee, Wisconsin.

Fearn Wins!

Dear Editor:

When Clyde F. Beck descended with righteous indignation and satisfying vigor upon the unbowed head of Jr.—J. R. Fearn—I backed him to the letter. When Philip Johnson remarked sarcastically on your thirteen-year-old reader's enthusiasm over Fearn's conceptions, I nodded sagely.

And I couldn't be blamed. After suffering under the stress of *The Blue Infinity* and *Earth's Mausoleum*, it was logical for me to indulge in sage nodding and to be ashamed of and cover up the fact that I liked *Mathematica*. But no longer!

With *Mathematica Plus* Fearn has vindicated my opinion of the story to which it was a sequel. *Mathematica* has been justly criticized for lack of unity—and naturally—because it hadn't been finished. "Plus" was the resolving point of the whole thing, the other and most important half of one story; for instead of having a dozen different roots and as many differ-

ent ends, it would have fitted all together in one super novel; a masterpiece of logical and yet staggering thinking; a theory that is at the same time the most unbelievable and yet the only one possible! The ether is the intangible mathematical principle! Mind the individual equation! The universe unresolvable! Matter and energy the cancellable factors, the variables!

And you can see that authors steadily are returning to the same conclusion, although not expressing it as perfectly. Many stories have approached or expounded the idea of matter and energy being mind, those by Eshback especially. And why not? Already we have seen examples of strong beliefs of a powerful mind becoming tangible reality; for instance, remember the boy who was touched with a piece of ice during the initiation and thought he was being burned? A blister rose almost immediately on his back!

But to Fearn will go the distinction of having for the first time resolved psychology, mathematics, and astrophysics into one unified whole.—Jim Blish, 131 Harrison Street, East Orange, New Jersey.

After All—It Is Fiction.

Dear Editor:

I have something to kick about; it does not concern the magazine itself, but a certain type of story which is so prevalent in science-fiction. Despite the fact that scientists have struggled unsuccessfully for years to locate the long lost semi-mythical Atlantis, our hero's submarine sinks; and he immediately finds himself in Atlantis. In other words, he chances upon the proverbial needle in the haystack purely by accident. It seems nowadays a respectable person can't even have a faulty submarine without finding himself in Atlantis.

Not only that, but our hero discovers that the Atlanteans are still in existence; however, they have become half man, half fish, so that they can live in the briny H₂O with perfect ease. Now tell me, if an island of people should suddenly sink in mid-ocean, does it seem probable that any number of them would be able to keep themselves alive for the length of time necessary for piscatorial degeneration?

Trivial matter, I realize; but I'm glad you've cut out those sensational-appearing exclamation points on your caption before each Brass Place. Even the period is unnecessary; whoever places a period after the title of a book?

I hope that Marchioni won't feel hurt if I say that Schneeman produced a more pleasing if not more detailed illustration for *Mathematica Plus* than Marchioni did for *Mathematica*. Incidentally, it appears that Mr. M. has become your chief staff artist in Dold's absence. But no one can equal Dold! Your newest illustrator, Hopper, has a pleasing, clear style after all these black-shaded faces and slurry backgrounds that so many artists possess.

Red Storm on Jupiter receives my vote as the best story in the issue. In this story, Long seems to have captured the style that was Weinbaum's. Do you agree? *Elimination* was interesting, but slightly confused. *The W62's Last Flight* was the best of the W62 series; thank heavens it's the last! Now please (I'm on my knees with my hands clasped) don't revive the series with *The Return of W62* or *The Ghost of W62* or some such stuff. We don't want a literary Frankenstein's monster in our midst.

This next paragraph is a hopeful attempt to end all such statements as this: "I don't care if Astounding is printed on wrapping paper, with uneven edges, and bound with string; it's the reading matter that counts, not the format." The people who write such statements are those who do not collect, file, and save their copies of Astounding, but who are content to read the magazine and throw it away. If they could but see the neatness of a nicely stacked pile of Astoundings and feel the satisfaction that comes from thumbing through the pages of back issues, I am sure their opinions would undergo a speedy change.—Willis Conover, Jr., 280 Shepard Avenue, Kenmore, New York.

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